ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2012

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS
HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

RODNEY P. FRELINGHUYSEN, New Jersey, *Chairman*

JERRY LEWIS, California	PETER J. VISCLOSKY, Indiana
MICHAEL K. SIMPSON, Idaho	ED PASTOR, Arizona
DENNY REHBERG, Montana	CHAKA FATTAH, Pennsylvania
RODNEY ALEXANDER, Louisiana	JOHN W. OLVER, Massachusetts
STEVE WOMACK, Arkansas	
ALAN NUNNELEE, Mississippi	

NOTE: Under Committee Rules, Mr. Rogers, as Chairman of the Full Committee, and Mr. Dicks, as Ranking Minority Member of the Full Committee, are authorized to sit as Members of all Subcommittees.

ROB BLAIR, JOSEPH LEVIN, ANGIE GIANCARLO,
LORAINE HECKENBERG, and PERRY YATES,
Staff Assistants

PART 7
DEPARTMENT OF ENERGY

Page

Department of Energy **1**

Department of Energy—Nuclear Energy and Nuclear Regulatory Commission, FY 2012 Budget **187**

Printed for the use of the Committee on Appropriations

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2012

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT

RODNEY P. FRELINGHUYSEN, New Jersey, *Chairman*

JERRY LEWIS, California
MICHAEL K. SIMPSON, Idaho
DENNY REHBERG, Montana
RODNEY ALEXANDER, Louisiana
STEVE WOMACK, Arkansas
ALAN NUNNELEE, Mississippi

PETER J. VISCLOSKY, Indiana
ED PASTOR, Arizona
CHAKA FATTAH, Pennsylvania
JOHN W. OLVER, Massachusetts

NOTE: Under Committee Rules, Mr. Rogers, as Chairman of the Full Committee, and Mr. Dicks, as Ranking Minority Member of the Full Committee, are authorized to sit as Members of all Subcommittees.

ROB BLAIR, JOSEPH LEVIN, ANGIE GIANCARLO,
LORAINE HECKENBERG, and PERRY YATES,
Staff Assistants

PART 7

DEPARTMENT OF ENERGY

Page

Department of Energy **1**

Department of Energy—Nuclear Energy and Nuclear Regulatory Commission, FY 2012 Budget **187**

Printed for the use of the Committee on Appropriations

U.S. GOVERNMENT PRINTING OFFICE

74–136 WASHINGTON : 2012

COMMITTEE ON APPROPRIATIONS

HAROLD ROGERS, Kentucky, *Chairman*

C. W. BILL YOUNG, Florida[1]
JERRY LEWIS, California[1]
FRANK R. WOLF, Virginia
JACK KINGSTON, Georgia
RODNEY P. FRELINGHUYSEN, New Jersey
TOM LATHAM, Iowa
ROBERT B. ADERHOLT, Alabama
JO ANN EMERSON, Missouri
KAY GRANGER, Texas
MICHAEL K. SIMPSON, Idaho
JOHN ABNEY CULBERSON, Texas
ANDER CRENSHAW, Florida
DENNY REHBERG, Montana
JOHN R. CARTER, Texas
RODNEY ALEXANDER, Louisiana
KEN CALVERT, California
JO BONNER, Alabama
STEVEN C. LaTOURETTE, Ohio
TOM COLE, Oklahoma
JEFF FLAKE, Arizona
MARIO DIAZ-BALART, Florida
CHARLES W. DENT, Pennsylvania
STEVE AUSTRIA, Ohio
CYNTHIA M. LUMMIS, Wyoming
TOM GRAVES, Georgia
KEVIN YODER, Kansas
STEVE WOMACK, Arkansas
ALAN NUNNELEE, Mississippi

NORMAN D. DICKS, Washington
MARCY KAPTUR, Ohio
PETER J. VISCLOSKY, Indiana
NITA M. LOWEY, New York
JOSÉ E. SERRANO, New York
ROSA L. DeLAURO, Connecticut
JAMES P. MORAN, Virginia
JOHN W. OLVER, Massachusetts
ED PASTOR, Arizona
DAVID E. PRICE, North Carolina
MAURICE D. HINCHEY, New York
LUCILLE ROYBAL-ALLARD, California
SAM FARR, California
JESSE L. JACKSON, Jr., Illinois
CHAKA FATTAH, Pennsylvania
STEVEN R. ROTHMAN, New Jersey
SANFORD D. BISHOP, Jr., Georgia
BARBARA LEE, California
ADAM B. SCHIFF, California
MICHAEL M. HONDA, California
BETTY McCOLLUM, Minnesota

---

[1] Chairman Emeritus.

William B. Inglee, *Clerk and Staff Director*

ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2012

TUESDAY, MARCH 15, 2011.

DEPARTMENT OF ENERGY

WITNESS

HON. DR. STEVEN CHU, SECRETARY, DEPARTMENT OF ENERGY

Mr. FRELINGHUYSEN. I would like to call this hearing to order. Good morning, everyone. Our hearing today is on the Fiscal Year 2012 budget request for the Department of Energy. I would like to welcome our witness, Secretary of Energy, Dr. Steven Chu to the hearing.

This has been a tragic weekend. I know all of our hearts and prayers are with the people of Japan as they struggle to recover from the devastations they have suffered, a huge loss of life and livelihoods.

Mr. Secretary, we all recognize that you do not control the energy sector of the United States—no one person does. But your voice, and the actions of this Administration, have the power to shape opinion and markets. Above all, you have the ability to put our country on a path to a sound, science-based energy policy.

This was true even before Friday's earthquake and tsunami off the coast of Japan. Facing continued unrest in the Middle East and North Africa, four dollar gasoline, and persistently high joblessness, our citizens are crying out for leadership to help resolve these issues. It is little wonder we don't have a cogent energy policy if we can't agree on the domestic and foreign policies that underlie them.

Whether natural or manmade, we must be able to confront disasters or political realties in the Middle East by having a diversity of supply that doesn't leave us hostage to any one source. This nation is blessed with many energy options: unlimited coal supplies, natural gas, oil on shore and off shore, and companies and workers that are willing to tap them for us. Other companies and entrepreneurs are increasing our renewable footprint and we have, as a country, sun and wind resources and the ingenuity to develop them further. To the Administration's credit, after a 30 year hiatus, we are now committing more resources to a new generation of nuclear power.

I personally support nuclear energy and I want our bill to assure its key role in a clean energy portfolio, alongside other sources, to meet our nation's future needs. This morning we hope to hear from you, Mr. Secretary, about your own commitment as President Obama's chief spokesman on energy policy.

Even more important, we need to hear from you that we have a strong safety program for our existing plants that has already taken into consideration hurricanes, earthquakes and homeland security measures in their designs and operating procedures. And, yes that Yucca Mountain be reopened.

Unfortunately, while you support nuclear plant construction, your 2012 budget request seems to do more to undermine our national energy security, in the short-term, than help it. Rather than take steps to improve access to domestic sources of fuel, in a cleaner, safer way, your budget would actually cut fossil fuel research and development that we need to meet today's demands. And rather than proposing well-developed, justified increases, your request includes billions of dollars with little more than a paragraph of explanation.

As I have said in every hearing we have had this year, it will be highly unlikely that this subcommittee will see an increase in funding in 2012. And our task this budget cycle is very different than past years: funding the right balance of investments of our most critical needs, with an eye towards those that protect our nation and that create jobs, sustainable jobs.

At this point, I will end my remarks. We will have plenty of time to engage in questions.

Secretary Chu, please ensure that the hearing record, questions for the record, and any supporting information requested by the subcommittee are delivered in final form to us no later than four weeks from the time you receive them. Members who have additional questions for the record will have until close of business tomorrow to provide them to the subcommittee office.

With that I turn to our Ranking Member Mr. Pastor for any remarks that he may wish to make. Mr. Pastor.

Mr. PASTOR. Good morning, Mr. Chairman and thank you very much for yielding the time.

Good morning, Dr. Chu. Welcome back. I look forward to your testimony and your insights into the budget request.

The recent events in the Middle East and Japan reinforce the pressing need for a comprehensive national energy policy for the 21st century. As we discuss the merits and structure of that policy, the Department of Energy must take a leadership role in the transformation of our energy sector. I firmly support the principle that innovation, technology and research and development should be at the very core of our national effort to this end.

I do believe we can invent and invest our way out of our energy problems and that our government should lead the way. However, within the current budget environment, it is even more critical that each dollar be well justified and to the extent that it is possible, leveraged with the private sector. To be clear, government is not the whole answer. We must structure the government's role to complement the role of the private sector.

In your testimony today I would like to know last year when we dealt with the budget we talked about some of the management issues and some of the policies and cost estimates that the GAO had talked about and possibly see how you have addressed this issue and where we are at today with the Department of Energy.

I also, along with the Chairman, would like to hear what we are doing to assist Japan. This Sunday with the talking heads on various Sunday programs right away they are either wanting to stop our nuclear energy initiative or in many cases asking us to slow that initiative and I would like to hear your points of view on that. I would also like to hear more about, some of your priorities that you have with this budget.

Obviously I think as the Chairman said that we are not going to increase the money, and there is great probability we will decrease some money available in your budget, so where your priorities may be in terms of some of the initiatives that you have had for the last two years and where you see the future going will be important.

So Mr. Secretary I look forward to hearing from you today how the fiscal year 2012 budget request will help address the energy and national-security challenges we face and how your management plans will ensure efficient planning and execution. Thank you, Mr. Chairman. I yield back.

Mr. FRELINGHUYSEN. Thank you, Mr. Pastor. Mr. Secretary, good morning. Thank you for being with us.

Secretary CHU. Thank you, Chairman Frelinghuysen and Mr. Pastor and other members of the Committee. I thank you for the opportunity to discuss the President's fiscal 2012 budget request from the Department of Energy. Your support will be critical to our mission and I look forward to continuing our relationship with this committee.

I want to begin by expressing the Administration's support for the people of Japan and American citizens in Japan as they respond to and recover from the tragic events of the past few days. Officials from the Department of Energy, the Nuclear Regulatory Commission, and other agencies have maintained close contact with Japanese officials and have provided the Japanese government with expertise in a variety of areas.

As part of this effort, the Department of Energy has sent 2 experts at the beginning and another, I believe, 33 to Japan provide advice and technical assistance. One is an emergency response representative deployed as part of the U.S. Agency for International Development's Disaster Response Team, others including nuclear engineers with Japanese language skills, and finally a larger contingent to give them monitoring equipment and other items so that they can better monitor the situation.

We are positioning sequence management response teams in the U.S. Consulates and military installations in Japan. These teams have the skills, expertise and equipment to help assess, survey, monitor and sample areas, and includes smaller groups that could be sent out to gather technical information in the area. We have sent our aerial measurement system capability including detectors and nautical equipment to provide assessments of contamination on the ground. In total, this team includes 34 people.

The Department is also monitoring activities through the Department of Energy's Nuclear Incident Team and is employing assets at its national laboratories to provide ongoing predictive atmospheric modeling capabilities based on a variety of scenarios. I was up until 2:30 last night looking at those.

And the American people should have full confidence that the United States has rigorous safety regulations in place to ensure that our nuclear power is generated safely and responsibly.

Information is still coming in about the events unfolding in Japan, but the Administration is committed to learning from Japan's experience to work to continue and strengthen America's nuclear industry. Safety remains at the forefront of our effort to responsibly develop America's energy resources and we continue to incorporate the best practices and lessons learned in that process.

To meet our energy needs the Administration believes we must rely on a diverse set of energy sources including renewables like wind and solar, natural gas, clean coal, and nuclear power. We look forward to a continued dialogue with Congress on moving that agenda forward.

Now I would like to turn over to the budget. President Obama has a plan to win the future by out-innovating, out-educating and out-building the rest of the world, at the same time addressing the deficit. The President's budget makes tough choices, cutting in many areas while recognizing we must invest in strategic areas like clean energy innovation that will create jobs and strengthen competitiveness. To that end, President Obama called for an increase in investments in clean energy research, development and deployment. In addition, he has proposed an ambitious but achievable goal of generating 80 percent of America's electricity from clean sources by 2035. A clean energy standard will provide a clear long-term signal to industry to bring capital off the sidelines and into the clean energy sector. The government does not need to pick favorites. The most competitive clean energy sources will win in the marketplace.

The Department of Energy's fiscal year 2012 budget request of $29.5 billion supports the President's goals. Defense-related activities such as nonproliferation and clean-up of Cold War sites account for roughly half our budget. The other half which includes energy and science programs is also critical to the nation's security in addition to our competitiveness.

Through the Energy Efficiency Programs we will save money for consumers by saving energy. In addition, the budget supports research, development and deployment of renewable energy, the modernization of the electric grid and advancement of carbon capture and sequestration technologies. And it helps reduce our dependence on oil by developing the next generation of biofuels and accelerating electric vehicle research and deployment. The budget supports loan guarantees for renewable and energy-efficiency technologies.

Nuclear energy also has an important role to play in our energy portfolio. The budget requests up to $36 billion in loan guarantee authority to help deploy a new generation of American nuclear reactors. It also invests in the research and development of advanced nuclear technologies.

The President's budget keeps us on a path to doubling funding for key science agencies including our Office of Science. In addition to advancing groundbreaking research, the Office of Science supports some of the nation's most advanced R&D user facilities which many U.S. companies utilize to improve their competitiveness. The budget also invests $550 million in the Advanced Research Projects Agency for Energy. The Administration also seeks an additional $100 million as part of the President's Wireless Initiative and Infrastructure.

Another key piece of our research effort is the energy innovation hubs. The hubs bring together our nation's top scientists and engineers to achieve similar game-changing energy goals, but where a concentrated effort over a longer horizon is needed to establish innovation leadership. The budget requests $146 million to support the three existing hubs and to establish three new hubs.

Finally, the budget supports the Energy Frontier Research Centers which are mostly university-led teams working to solve specific scientific problems that are blocking clean energy development. To reach our research goals we must take a portfolio approach to R&D by pursuing several research strategies that have been proven to be successful in the past, but this is not a kitchen sink approach. This is work being coordinated and prioritized with a 360-degree view of how the pieces fit together. The budget request also strengthens security by providing $11.8 billion for the Department's National Nuclear Security Administration. The request of $7.6 billion for weapons activities provides a strong basis for transition to a smaller yet still safe, secure and effective nuclear stockpile without additional nuclear testing. It also provides much needed resources to strengthen science, technology and engineering capabilities and to modernize the physical infrastructure of our nuclear security enterprise.

To support the President's goal of securing all vulnerable nuclear material around the world in 4 years, the budget invests $2.5 billion in the Defense Nuclear Defense Nonproliferation Program.

The Department is mindful of our responsibility to the taxpayer. We are cutting back in multiple areas including eliminating unnecessary fossil fuel subsidies. We are streamlining operations and we are making some hard choices like freezing salaries and bonuses for hard-working national laboratory site and facility management contractor employees.

The United States faces a choice. Will we out-compete the rest of the world or will we fall behind? To lead the world in clean energy we must act now. We cannot afford not to. Thank you and I am pleased to answer your questions.

Statement of Secretary Steven Chu
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives

FY 2012 Budget Hearing
March 15, 2011

Chairman Rogers, Chairman Frelinghuysen, Ranking Member Dicks, Ranking Member Visclosky, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the President's Fiscal Year 2012 budget request for the Department of Energy.

In his State of the Union address, President Obama laid out a plan for the United States to win the future by out-innovating, out-educating and out-building the rest of the world, while at the same time addressing the deficit. The President's budget request invests in much-needed programs while cutting back where we can afford to.

Many countries are moving aggressively to develop and deploy the clean energy technologies that the world will demand in the coming years and decades. As the President said, this is our generation's "Sputnik moment."

We must rev up the great American innovation machine to win the clean energy race and secure our future prosperity. To that end, President Obama has called for increased investments in clean energy research, development and deployment. In addition, he has proposed a bold but achievable goal of generating 80 percent of America's electricity from clean sources by 2035.

A Clean Energy Standard will provide a clear, long-term signal to industry to bring capital off the sidelines and into the clean energy sector. It will grow the domestic market for clean sources of energy – creating jobs, driving innovation and enhancing national security. And by drawing on a wide range of energy sources including renewables, nuclear, clean coal and natural gas, it will give utilities the flexibility they need to meet our clean energy goal while protecting consumers in every region of the country.

The Department of Energy's FY 12 budget request of $29.5 billion supports these goals and strengthens the nation's economy and security by investing in the following priorities:

- Supporting groundbreaking basic science, research and innovation to solve our energy challenges and ensure that the United States remains at the forefront of science and technology;

- Leading in the development and deployment of clean and efficient energy technologies to reduce our dependence on oil, accelerate the transition to a clean energy economy and promote economic competitiveness; and

- Strengthening national security by reducing nuclear dangers, maintaining a safe, secure and effective nuclear deterrent and cleaning up our Cold War nuclear legacy.

While we are investing in areas that are critical to our future, we are also rooting out programs that aren't needed and making hard choices to tighten our belt. Additionally, we are improving our management and operations so we function more efficiently and effectively.

Leading in the Global Clean Energy Economy

As the President said in his State of the Union address, investing in clean energy will strengthen our security, protect our planet, and create countless new jobs here at home. The Department's budget request invests $3.2 billion in energy efficiency and renewable energy programs.

Through programs to make homes and buildings more energy efficient, including a new "Better Buildings Initiative" to make commercial buildings 20 percent more efficient over the next decade, we will save money for families and businesses by saving energy. That is money that can be re-invested back into the economy. In addition, the budget supports the research, development and deployment of renewable sources of energy like wind, solar and geothermal. It supports the modernization of the electric grid and the advancement of carbon capture and sequestration technologies. And it helps reduce our dependence on oil by developing the next generation of biofuels and accelerating electric vehicle research and deployment to support the President's goal of putting one million electric vehicles on the road by 2015. This includes a $200 million competitive program to encourage communities to invest in electric vehicle infrastructure.

We're also focused on moving clean energy technologies from the lab to the marketplace. Over the past two years, the Department's loan programs have supported more than $26 billion in loans, loan guarantees, and conditional commitments to guarantee loans for 23 clean energy and enhanced automotive fuel efficiency projects across the country, which the companies estimate will create or save more than 58,000 jobs. Building on this success, we are requesting new credit subsidy that will support approximately $1 billion to $2 billion in loan guarantees for innovative renewable energy and energy efficiency technologies. These deployment efforts build on the substantial investment made in the clean energy sector by the Recovery Act, and are supplemented by tax incentives that have also played an important role in bringing clean energy projects to market, such as the 48C manufacturing tax credits and the 1603 cash grants in lieu of investment tax credits, which the 2012 budget also expands. We are also requesting $100 million in credit subsidy for a new "Better Buildings Pilot Loan Guarantee Initiative for

Universities, Schools, and Hospitals," which will guarantee up to $2 billion in loans to support energy efficient retrofits.

Nuclear energy also has an important role to play in our energy portfolio. To jumpstart the domestic nuclear industry, the budget requests up to $36 billion in loan guarantee authority. It also invests in the research and development of advanced nuclear technologies, including small modular reactors.

Supporting Groundbreaking Science

To spur innovation, the President's budget request invests in basic and applied research and keeps us on the path to doubling funding for key science agencies, including the Department's Office of Science. As Norm Augustine, former Chairman of Lockheed Martin and former Under Secretary of the Army, has said, under-funding R&D in a time of austerity is like removing the engine of an aircraft to reduce its weight.

That is why the budget request increases support for the Department's comprehensive research strategy to accelerate energy breakthroughs.

Through $5.4 billion for the Office of Science, we're expanding our investment in basic energy sciences, advanced scientific computing and biological and environmental sciences – all key areas for our future economic competitiveness.

The budget invests $550 million in the Advanced Research Projects Agency-Energy, also known as ARPA-E. The Administration also seeks an additional $100 million for ARPA-E from the Wireless Innovation Fund to support wireless clean energy technologies. This investment will allow ARPA-E to continue the promising early-stage research projects that aim to deliver game-changing clean energy technologies. ARPA-E's projects are generating excitement both in the Department and in the private sector. For example, through a combined total of $24 million from ARPA-E, six companies have been able to advance their research efforts and show the potential viability of their cutting-edge technologies. This extremely valuable early support enabled those companies to achieve R&D milestones that, in turn, have attracted more than $100 million in private sector funds to the projects. This is precisely the innovation leverage that is needed to win the future.

Another key piece of our research effort is the Energy Innovation Hubs. Through the Hubs, we are bringing together our nation's top scientists and engineers to achieve similar game-changing energy goals, but where a concentrated effort over a longer time horizon is needed to establish innovation leadership. The Department has established three Energy Innovation Hubs in the areas of energy efficient buildings, modeling and simulation for nuclear reactors and fuels from sunlight. The budget requests $146 million to support the three existing Hubs and to establish three new Hubs in the areas of batteries and energy storage, smart grid technologies and systems, and critical materials. The Energy Innovation Hubs were modeled after the Department of Energy's BioEnergy Institutes, which have established an outstanding three-year track record.

Finally, the budget continues to support the Energy Frontier Research Centers, which are mostly university-led teams working to solve specific scientific problems that are blocking clean energy development.

The Energy Innovation Hubs, ARPA-E, and EFRCs represent three complementary approaches to advance groundbreaking discovery. When you think of the EFRCs, think about a collaborative team of scientists such as Watson and Crick unlocking the secrets of DNA. When you think of ARPA-E, think about visionary risk-takers launching new technologies and start-up companies out of their garages. When you think of the Hubs, think of large, mission-oriented research efforts such as the Manhattan Project, the development of radar at MIT's Radiation Laboratory during World War II and the research in America's great industrial laboratories in their heyday.

We don't know where the big energy breakthroughs are going to come from. To reach our energy goals, we must take a portfolio approach to R&D: pursuing several research strategies that have proven to be successful in the past. But I want to be clear – this is not a "kitchen sink" approach. This work is being coordinated and prioritized, with a 360-degree view of how these pieces fit together. Taken together, these initiatives will help America lead in science and technology innovation.

Nuclear Safety and Security

In addition to strengthening our economy, the budget request also strengthens our security by providing $11.8 billion for the Department's National Nuclear Security Administration. The five-year FY 12 to FY 16 request of nearly $65 billion for NNSA reflects the President's nuclear security priorities, as well as his commitment to modernize the U.S. nuclear weapons enterprise and sustain a strong nuclear deterrent for the duration of the New START Treaty and beyond.

The request of $7.6 billion for Weapons Activities provides a strong basis for transitioning to a smaller yet still safe, secure and effective nuclear stockpile without additional nuclear testing. It also provides much-needed resources to strengthen science, technology and engineering capabilities and to modernize the physical infrastructure of our nuclear security enterprise.

The President has identified the danger of terrorists getting their hands on nuclear weapons or the material to build them as the greatest threat to global security. To support the President's goal of securing all vulnerable nuclear material around the world in four years, the budget invests $2.5 billion in the NNSA Defense Nuclear Nonproliferation program. This is part of a five-year, $14.2 billion commitment for the program.

The budget also requests $1.2 billion to support the Navy's nuclear powered submarines and aircraft carriers. And it provides $6.1 billion to protect public health and safety by cleaning up the nation's Cold War nuclear legacy.

Fiscal Responsibility

Through our investments, we are laying the groundwork for the nation's future prosperity and security. At the same time, we are mindful of our responsibility to the taxpayer.

We are cutting back in multiple areas, including eliminating unnecessary fossil fuel subsidies, reducing funding for the Fossil Energy program and reducing funding for the hydrogen technology program. We're streamlining operations to reduce administrative costs. And we're making some painful cuts, including ending operation of the Tevatron accelerator and freezing salary and bonuses for hard-working National Laboratory, site and facility management contractor employees.

Finally, we continue to make progress on a management excellence agenda to improve our operations.

The United States faces a choice today will we lead in innovation and out-compete the rest of the world or will we fall behind? To lead the world in clean energy, we must act now. We can't afford not to.

Thank you, and now I am pleased to answer any questions you may have.

HIGHLIGHTS OF THE FY 2012 BUDGET REQUEST

In his State of the Union address, President Obama said that America faces "our generation's Sputnik moment" and that we need to out-innovate, out-educate and out-build the rest of the world to capture the jobs of the 21st century. "In America, innovation doesn't just change our lives. It's how we make our living." Through innovation in promising areas like clean energy, the United States will win the future and create new industries and new jobs. To lead in the global clean energy economy, we must mobilize America's innovation machine in order to bring technologies from the laboratory to the marketplace. The Department of Energy (DOE) is on the front lines of this effort. To succeed, the Department will pursue game-changing breakthroughs, invest in innovative technologies, and demonstrate commercially viable solutions.

In addition to energy advances that spark economic growth, national security remains fundamental to the Department's mission. Through bipartisan ratification of the New START treaty with Russia, America and its global partners are leading by example in implementing the focused expansion of domestic and international activities to reduce the threat of nuclear weapons, nuclear proliferation, and unsecured or excess weapons-usable materials. The National Nuclear Security Administration (NNSA) supports the international effort to secure all vulnerable nuclear materials around the world within four years. The NNSA also fulfills the President's commitment to modernize the nation's nuclear stockpile until a world without nuclear weapons can be realized.

The Department's Fiscal Year (FY) 2012 budget request is $29.5 billion, an 11.8 percent or $3.1 billion increase from FY 2010 current appropriation levels. The FY 2012 request supports the President's goals to increase America's competitiveness by making strategic investments in our nation's clean energy infrastructure and to strengthen our national security by reducing the global threat of nuclear materials. The President has called for advancing research on clean energy technologies and manufacturing, doubling the share of electricity generated from clean energy supplies by 2035, and putting one million electric vehicles on the road by 2015. The Department's request prepares for a multi-year effort to address these interconnected objectives and prioritizes research and development of renewable energy technologies to expand sustainable energy options for the United States.

The FY 2012 budget builds on the intense planning, execution, and oversight of the $35.2 billion from the American Recovery and Reinvestment Act of 2009. By the end of FY 2010, the Department successfully obligated $32.7 billion of Recovery Act funds, including all funding that was set to expire. In developing the FY 2012 budget request, the Department has taken these investments into account and will oversee execution of these funds with value to the taxpayer in mind. Recovery Act investments are focused on energy conservation and renewable energy sources ($16.8 billion), environmental cleanup ($6 billion), loan guarantees for renewable energy and electric power transmission projects ($2.4 billion), grid modernization ($4.5 billion), carbon capture and sequestration ($3.4 billion), basic science research ($1.6 billion), and the Advanced Research Projects Agency – Energy ($0.4 billion). The Department's Recovery Act activities are strengthening the economy by providing much-needed investment, saving or creating tens of thousands of jobs, cutting carbon pollution, and reducing U.S. dependence on oil.

The President's FY 2012 Budget supports three strategic priorities:

- **Transformational Energy:** Accelerate the transformation to a clean energy economy and secure U.S. leadership in clean energy technologies.
- **Economic Prosperity:** Strengthen U.S. science and engineering efforts to serve as a cornerstone of our economic prosperity and lead through energy efficiency and secure forms of energy.
- **Nuclear Security:** Enhance nuclear security through defense, nonproliferation, naval reactors, and environmental cleanup efforts.

As the President has articulated, innovation is essential to America's economic competitiveness. To meet the challenge of 'our generation's Sputnik moment,' the Department supports a coordinated strategy for research and development across all of its programs. With every initiative the Department undertakes, sound science is at the core. In FY 2012, we will increasingly emphasize cross-cutting initiatives to link science throughout the Department, specifically with energy and national security programs in order to deliver results to the American taxpayer. In the Office of Science, the Department requests $5.4 billion, a 9.1 percent or $452 million increase over the FY 2010 current appropriation levels, to support an elevated focus on the advancement of the

United States' leadership in fundamental research. Advanced Research Projects Agency – Energy (ARPA-E) is building on established gains since its initial funding in FY 2009 through the Recovery Act to perform transformational research and create game-changing breakthroughs for eventual market adoption. The FY 2012 budget request includes $550 million for ARPA-E to sustain investment in new energy technologies.

Energy Innovation Hubs play a key role in solving specific energy challenges by convening and focusing top scientific and engineering talent to focus on those problems. The Hubs bring together multidisciplinary team of researchers in an effort to speed research and shorten the path from scientific discovery to technological development and commercial deployment of highly promising energy-related technologies. The Department is proposing to double its commitment to this research approach by requesting three new Hubs to focus on batteries and energy storage, critical materials, and Smart Grid technologies and systems. The Department will continue funding the three Energy Innovation Hubs introduced in FY 2010 to focus on developing fuels that can be produced directly from sunlight, improving energy efficient building systems design, and using modeling and simulation tools to create a virtual model of an operating advanced nuclear reactor. Complementing the Hubs, the Department plans in FY 2012 to continue coordination with the Office of Science's Energy Frontier Research Centers, which exemplify the pursuits of broad-based science challenges for energy applications.

Energy Security: Promoting America's Energy Security through Reliable, Clean and Affordable Energy

In his State of the Union address, the President outlined clearly to the American people his roadmap for transforming our nation's energy economy to meet the demands of future generations. "Instead of subsidizing yesterday's energy, let's invest in tomorrow's," he said. To meet the President's challenge, the Department must recruit the sharpest research minds and build on its aggressive discovery agenda across all programs to achieve breakthroughs on the most pressing energy challenges facing the United States.

In his address, President Obama laid out a goal for clean energy sources to account for 80 percent of America's electricity by 2035. In FY 2012, the Department requests funds to help achieve this Presidential objective and address many of the energy delivery challenges facing American families and energy providers.

- **Applied Research, Development and Deployment:** Meeting the President's goal of making America the first country to have one million electric vehicles on the road by 2015, the Department will research cost competitive methods to develop electric vehicles, increase the adaptability and capacity of the grid to enable vehicle charging, incentivize communities to invest in electric vehicles and infrastructure and send these vehicles to the nation's roadways. The Department will also launch competitive manufacturing research for breakthrough technologies in energy efficiency diagnostics and retrofits to help business owners around the country save money on energy costs.

- **Loan Guarantees:** The Loan Programs Office (LPO) is a vital tool for promoting innovation in the energy sector across a broad portfolio of clean and efficient energy technologies. In FY 2012, the Department is requesting credit subsidies to support approximately $1 to $2 billion in loan guarantees for renewable energy deployment and up to $36 billion in additional authority to loan guarantees for nuclear power projects. The Department will also continue to streamline and prioritize the issuance of loan guarantees to leverage private sector investment in clean energy and energy efficiency projects that will save and create jobs.

- **Better Buildings Initiative:** Last year, commercial buildings consumed roughly 20 percent of all energy in the U.S. economy. Improving energy efficiency in our buildings can create jobs, save money, reduce our dependence on oil, and make our air cleaner. The President's Better Buildings Initiative will make commercial buildings 20 percent more energy efficient over the next decade through initiatives that include: re-designing the current tax deduction for commercial buildings and upgrades to a credit that is more generous and that will encourage building owners and real estate investment trusts (REITs) to retrofit their properties; improving financing opportunities for retrofits through programs including a new Better Buildings Pilot Loan Guarantee Initiative for Universities, Schools and Hospitals, for which the Department of Energy requests $100 million in credit subsidy to guarantee up to $2 billion in loans for energy efficiency retrofits for these facilities; creating a $100 million Race to Green competitive grant program for state and municipal governments to implement innovative approaches to building codes, performance standards, and regulations so that commercial building efficiency will become the norm in communities across the country; and calling on CEOs and university presidents to join the Department of Energy and other Federal partners in a Better Buildings Challenge to make their organizations leaders in saving energy. The Better Buildings Initiative builds on our investments through the Recovery Act and our continued commitment to passing "HOMESTAR" legislation to encourage American families to make energy saving upgrades in their homes.

- **Electricity Reliability and Energy Management:** Reliable, affordable, efficient, and secure electric power is vital to expanding economic recovery, protecting critical infrastructures, and enabling the transition to renewable energy sources. The FY 2012 request invests $238 million to bring the next generation of grid modernization technologies closer to deployment and commercialization, to assist states and regional partners in grid modernization efforts, and to facilitate recovery from energy supply disruptions when they occur. The request includes a new Smart Grid Technology and Systems Hub that will address the total electricity system, covering applied science, technology, economic, and policy issues that affect our ability to modernize the grid. The FY 2012 request also plans an expansion of the Home Energy Score program that provides homeowners with information on how their homes can be more energy efficient and guidance for saving on home energy costs. This is in addition to the President's support for passage of the Home Star rebate program in 2011.

Investing in energy efficiency, renewable energy generation, and grid modernization are fundamental steps necessary for creating a clean energy economy. We must also invest in the improvement of existing sources of energy that will provide a bridge between current and future technologies. These technologies are already a major segment of the energy mix and will play a critical role in providing a solid foundation that will make possible the creation of a new energy economy.

- **Leadership in Nuclear Energy:** Nuclear energy currently supplies approximately 20 percent of the Nation's electricity and 70 percent of the Nation's clean, non-carbon electricity. The request for the Office of Nuclear Energy includes $380 million for research and development, in addition to key investments in supportive infrastructure. In addition, the Department is engaging in cost-shared activities with industry that may help accelerate commercial deployment of small modular reactors. The request includes funding for cost-shared design certification and licensing activities for small modular reactors, the deployment of which holds promise for vastly increasing the generation of clean energy on a cost competitive basis. The Department will also promote nuclear power through the Loan Guarantee Program, which is requesting up to $36 billion in additional loan guarantee authority in FY 2012.

- **Advanced Fossil Energy: Experience in Carbon Capture and Storage:** The world will continue to rely on coal-fired electrical generation to meet energy demand. It is imperative that the United States develop the technology to ensure that base-load electricity generation is as clean and reliable as possible. The Office of Fossil Energy requests $452.9 million for research and development of advanced coal-fueled power systems and carbon capture and storage technologies. The Budget focuses resources within the fossil energy program on activities that can reduce carbon pollution and have potential benefits for both the existing fleet and new power plants – specifically, post-combustion capture R&D and geologic carbon storage R&D.

- **Ending Tax Subsidies to Fossil Fuel Producers:** In accordance with the President's agreement at the G-20 Summit in Pittsburgh to phase out subsidies for fossil fuels so that we can transition to a 21st century energy economy, the Administration proposes to repeal a number of tax preferences available for fossil fuels. Tax subsidies proposed for repeal include, but are not limited to: the credit for oil and gas produced from marginal wells; the deduction for costs paid or incurred for any tertiary injectant used as part of a tertiary oil recovery method; the ability to claim the domestic manufacturing deduction against income derived from the production of oil and gas and coal; and expensing the exploration and development costs for coal.

Economic Security: Sharpening America's Competitive Edge through a Clean Energy Economy

To meet "our generation's Sputnik moment" and promote economic competitiveness, the U.S. must demonstrate leadership in clean energy technologies. "We'll invest in biomedical research, information technology and especially clean energy technology – an investment that will strengthen our security, protect our planet, and create countless new jobs for our people," said President Obama before Congress in the State of the Union address. President Obama outlined his comprehensive vision to lead our nation's clean energy economy and provide economic security to Americans. As the Administration seeks to reduce federal government spending, the Department recognizes its role and has tightened its expenditures in several areas such as oil and natural gas. The FY 2012 budget request acknowledges the Department's missions to achieve these imperative goals while setting forth a clean energy economy for entrepreneurs and manufacturers to reclaim their competitive edge in clean energy innovation.

The Department plans to promote economic security by building on the progress made through the over $32 billion in grants and contracts under the American Recovery and Reinvestment Act of 2009, which made historic investments in the nation's economy and has put the country on target to double renewable energy generation by 2012. The Recovery Act helped create tens of thousands of jobs and, combined with the FY 2012 request, will help the Department accelerate the transition of our nation to a clean energy economy.

The President's FY 2012 Budget supports the plan to rebuild our economy through clean energy research and development by:

- **Expanding ARPA-E to spur innovation** – The President's request proposes $550 million for the Advanced Research Projects Agency – Energy (ARPA-E) program, plus an additional $100 million for the program from the Wireless Innovation and Infrastructure Initiative for a total of $650 million. ARPA-E performs transformational and cutting edge energy research with real-world applications in areas ranging from grid technology and power electronics to batteries and energy storage. The budget also supports programs with significant promise to provide reliable, sustainable energy across the country, such as the SunShot initiative aimed at making solar energy cost competitive. With focused investment in manufacturing innovation and industrial technical efficiencies, the President's proposal will move private sector capital off the shelves and into the marketplace.

- **Targeting investments for future economic growth** – To secure a competitive advantage in high-tech industries and maintain international leadership in scientific computing, we will invest in core research activities for energy technologies, the development of general biological design principles and new synthetic molecular toolkits to improve understanding of natural systems, and core research activities to advance the frontiers of high performance computing.

Underlying these investments in research is the education and training of thousands of scientists and engineers who contribute to the skilled scientific workforce needed for a 21st century innovation economy.

- **Doubling the number of Energy Innovation Hubs to solve key challenges** – Innovation breakthroughs occur when scientists collaborate on focused problems. The FY 2012 budget request proposes three new Energy Innovation Hubs that will bring top American scientists to work in teams on critical energy challenges in areas such as critical materials, batteries and energy storage, and Smart Grid technologies. These will join three existing Hubs that focus on fuel generation from sunlight, building efficiency, and nuclear reactor modeling and simulation.

- **Integrating Research & Development** - The Department has identified areas where coordinated work by discovery-oriented science and applied energy technology programs hold the greatest promise for progress in achieving our energy goals. The Energy Systems Simulation to increase the efficiency of the Internal Combustion Engine (ICE) will produce a set of modern, validated computer codes that could be used by design engineers to optimize the next generation of cleaner, more efficient combustion engines. An initiative on extreme environments will close the gap between actual and ideal performance of materials in nuclear environments. And the Department's Exascale Computing initiative will allow the Department to take the lead in developing the next generation of scientific tools and to advance scientific discoveries in solving practical problems.

- **Pursuing the passage of HOMESTAR** – Enactment of this program will create jobs by providing strong short-term incentives for energy efficiency improvements in residential buildings. The HOMESTAR program has the potential to accelerate our economic recovery by boosting demand for energy efficiency products and installation services. The program will provide rebates of $1000 to $3000 per household to encourage immediate investment in energy-efficient appliances, building mechanical systems and insulation, and whole-home energy efficiency retrofits. This program will help middle-class families save hundreds of dollars a year in energy costs while improving the comfort and value of their most important investment – their homes. In addition, the program would help reduce our economy's dependence on fossil fuels and support the development of an energy efficiency services sector in our economy.

- **Extending access to tax credit and tax grant programs** – Two provisions of the American Recovery and Reinvestment Act have been extraordinarily successful in spurring the deployment of renewable energy projects and building advanced manufacturing capabilities: Section 48C Advanced Energy Manufacturing Tax Credit program and the Section 1603 Energy Cash Assistance program. The Administration is pursuing an additional $5 billion in support for the Section 48C program, which, by providing a 30% tax credit for energy manufacturing facilities, will continue to help build a robust high-technology, U.S.

manufacturing capacity to supply clean energy projects with U.S. made parts and equipment. The Section 1603 tax grant program has created tens of thousands of jobs in industries such as wind and solar by providing up-front incentives to thousands of projects. The Administration is seeking a one-year extension of this program.

- **Promoting efficient energy use in our everyday lives** - Currently, weatherization of more than 300,000 homes of low income families has been achieved, providing energy cost savings and financial relief to households. The FY 2012 request of $320 million continues residential weatherization, while increasing the focus on new innovative approaches to residential home weatherization.

National Security: Securing Nuclear and Radiological Materials, Maintaining Nuclear Deterrence, and Advancing Responsible Legacy Cleanup

A pillar of President Obama's national security agenda for the United States is to eliminate the global threat posed by nuclear weapons and prevent weapons-usable nuclear material from falling into the hands of terrorists. As part of this agenda, the Administration and Congress worked tirelessly toward the December 2010 bipartisan ratification of the New Strategic Arms Reduction Treaty (New START) with Russia, which cuts the number of strategic nuclear weapons each country can deploy to 1,550. After signing this agreement in April 2010, President Obama said, "In many ways, nuclear weapons represent both the darkest days of the Cold War, and the most troubling threats of our time. Today, we've taken another step forward...in leaving behind the legacy of the 20th century while building a more secure future for our children. We've turned words into action. We've made progress that is clear and concrete. And we've demonstrated the importance of American leadership -- and American partnership -- on behalf of our own security, and the world's".

The Department's National Nuclear Security Administration (NNSA), through work with global partners and efforts to secure vulnerable nuclear materials, achieved significant milestones during FY 2010 and FY 2011 to reduce the risk of proliferation and leverage science to maintain our nation's nuclear deterrence. Additionally, the Environmental Management program made progress advancing responsible nuclear cleanup from the Cold War. The Department's FY 2012 request seeks to build upon these successes and advance the President's nuclear security agenda.

Reduce the Risk of Proliferation

In 2009, President Obama committed the United States to an international effort to secure vulnerable nuclear material worldwide in four years. To solidify international support for this effort, and to address the threat of nuclear terrorism, the President convened leaders from 47 countries at the Washington Nuclear Security Summit in April 2010. The Summit resulted in a Communiqué which stated, "Nuclear terrorism is one of the most challenging threats to international security, and strong nuclear security measures are the most effective means to prevent terrorists, criminals, or other unauthorized actors from acquiring nuclear materials."

The FY 2012 budget for the NNSA Defense Nuclear Nonproliferation program will help advance further work that is needed to meet the goals of President Obama and the Nuclear Security Summit, recognizing the urgency of the threat and making the full commitment to global cooperation on nonproliferation. The budget provides $2.5 billion in FY 2012, and $14.2 billion through FY 2016 to detect, secure, and dispose of dangerous nuclear and radiological material worldwide. This request is a decrease of 5 percent, or $138 million, from the FY 2011 request, which reflects completion of accelerated efforts to secure vulnerable nuclear materials within the President's stated timeframe. The decrease also reflects our decision to await agreement between the United States and Russia on detailed implementation milestones prior to requesting additional U.S. pledged funding to support Russian plutonium disposition. The FY 2012 budget request follows through on securing vulnerable materials and supports efforts to design new technologies in support of treaty monitoring and verification, which will contribute to implementation of New START. The budget also broadens cooperative nonproliferation initiatives with foreign governments and international organizations in support of the President's objective of a world without nuclear weapons. The budget continues the provision of security upgrades at selected sites, both within the United States and in foreign countries, to address outsider and insider threats, and accelerates the pace of research reactor conversions from use of highly-enriched uranium fuel to low-enriched uranium fuel.

Leverage Science to Maintain Nuclear Deterrence

The FY 2012 budget request advances the Department's commitment to the national security interests of the United States through stewardship of a safe, secure and effective nuclear weapons stockpile without the use of underground nuclear testing. The 2010 Nuclear Posture Review Report calls for the United States to reduce nuclear force levels. As the United States begins the reduction required by New START, the science, technology and engineering capabilities and intellectual capacity within the nuclear security enterprise become more critical to sustaining the U.S. nuclear deterrent. NNSA continues to emphasize these capabilities, including functioning as a national science, technology, and engineering resource to other agencies with national security responsibilities. Through the NNSA, the Department requests $7.6 billion for the Weapons Activities appropriation, an 8.9 percent, or $621 million, increase from the President's FY 2011 request. It also is an 18.9 percent, or $1.205 million increase from the FY 2010 enacted appropriation. This increase reflects an investment strategy that provides a strong basis for transitioning to a smaller yet still safe, secure and effective nuclear stockpile without additional nuclear testing, strengthening the science, technology and engineering base, modernizing the physical infrastructure, and streamlining the enterprise's physical and operational footprint. These investments will further enable the Nuclear Posture Review's comprehensive nuclear defense strategy, based on current and projected global threats that rely less on nuclear weapons, while strengthening the nation's nuclear deterrent through completing major stockpile system life extensions, stabilizing the science, technology and engineering base, and modernizing the infrastructure.

The Naval Reactors program ensures the safe and reliable operation of reactor plants in nuclear-powered submarines and aircraft carriers, constituting 45 percent of the U.S. Navy's combatants. The FY 2012 request for Naval Reactors of $1.2 billion, is an increase of $83.2 million or 7.8 percent over the FY 2011 request and $209 million or 18.1 percent above the FY 2010 enacted appropriation. Funding for this program is ramping up for reactor design and development efforts for the Ohio Class Replacement Submarine ($121 million), refueling of the Land-Based Prototype ($99.5 million), and recapitalization of the naval spent nuclear fuel infrastructure for the Spent Fuel Handling Recapitalization program ($53.8 million) at the Naval Reactors Facility located at the Idaho National Laboratory.

Advance Responsible Environmental Cleanup

The FY 2012 budget includes $6.13 billion for the Office of Environmental Management (EM), to protect public health and safety by cleaning up hazardous, radioactive legacy waste from the Manhattan Project and the Cold War. This funding will allow the program to continue to accelerate cleaning up and closing sites, focusing on activities with the greatest risk reduction. Acceleration of cleaning up sites where funding would have immediate impact was established as the overarching objective of the $6 billion in Recovery Act funding. EM will use the remaining $309 million of Recovery Act funding during FY 2012 as it completes footprint reduction and near-term completion cleanup activities.

As the Department continues to make progress in completing environmental cleanup, the FY 2012 budget request of $170 million for the Office of Legacy Management supports the Department's long-term stewardship responsibilities and payment of pensions and benefits for former contractor workers after site closure.

DEPARTMENT OF ENERGY FY 2012 PROGRAM OFFICE HIGHLIGHTS

Office of Science: Invest in the Building Blocks of American Innovation

The Department of Energy's Office of Science (SC) delivers scientific discoveries and major scientific tools to transform our understanding of energy and matter and advance the energy, economic, and national security of the United States. SC is the largest Federal sponsor of basic research in the physical sciences, supporting programs in areas such as physics, chemistry, biology, environmental sciences, applied mathematics, and computational sciences. In FY 2012, the Department requests $5.4 billion, an increase of 9.1 percent over the FY 2010 current appropriation, to invest in basic research. The FY 2012 request supports the President's *Strategy for American Innovation*, and is consistent with the goal of doubling funding at key basic research agencies, including the Office of

Science. The FY 2012 Office of Science budget request supports the following objectives from the *Strategy*, including:

- Unleash a clean energy revolution
- Strengthen and broaden American leadership in fundamental research
- Develop an advanced information technology ecosystem
- Educate the next generation with 21st century skills and create a world-class workforce

In FY 2012, SC continues to support fundamental research for scientific discovery, but today our country needs to move strongly to solve our energy problems. Therefore, the central theme of this year's budget in SC is research in new technologies for a clean energy future that address competing demands on our environment. These efforts, coordinated with the DOE applied technology programs and with input from the scientific community and industry, will emphasize research underpinning advances in non-carbon emitting energy sources, carbon capture and sequestration, transportation and fuel switching, transmission and energy storage, efficiency, and critical materials for energy applications.

In the area of advancing non-carbon energy sources, the FY 2012 budget request will provide for new investments in the science of interfaces and degradation relevant to solar photovoltaics, basic actinide chemistry research related to advanced nuclear fuel cycles, and research in materials under extreme environments relevant to extreme nuclear technology environments, and genomics-based research on biological design principles and synthetic biology tools to underpin bio-based energy solutions. Carbon capture and sequestration research will focus on novel molecular design for materials and multiscale dynamics of flow and plume migration, respectively. SC will initiate an energy systems simulation research effort focused on predictive modeling of combustion in an evolving fuel environment in support of the Department's efforts in transportation and alternative fuels. Also underpinning transportation and fuel switching, as well as energy storage, the FY 2012 request will support an Energy Innovation Hub for Batteries and Energy Storage. The Fuels from Sunlight Hub, established in FY 2010, as well as the Energy Frontier Research Centers and DOE Bioenergy Research Centers also continue. Research in enabling materials sciences will support needs of future electricity transmission systems and novel building materials to improve building efficiencies.

The FY 2012 budget request also provides for foundational science in condensed matter and materials physics, chemistry, biology, climate and environmental sciences, applied mathematics, computational and computer science, high energy physics, nuclear physics, plasma physics, and fusion energy sciences; and provides for research facilities and capabilities that keep U.S. researchers at the forefront of science. The FY 2012 request supports targeted increases in areas such as computational materials and chemistry by design, nanoelectronics, and advanced scientific applications and integrated application-hardware-software co-design for exascale, which position the U.S. to secure a competitive advantage in high-tech industries and maintain international leadership in scientific computing. Underlying these investments is the education and training of thousands of scientists and engineers who contribute to the skilled scientific workforce needed for the 21st century innovation economy.

The Office of Science supports investigators at about 300 academic institutions and from all of the DOE laboratories. Over 26,000 researchers from universities, national laboratories, industry, and international partners are expected to use the Office of Science scientific user facilities in FY 2012.

Advanced Research Projects Agency – Energy: Transformational Research and Development

The FY 2012 budget request includes $550 million for the Advanced Research Projects Agency – Energy (ARPA-E), plus an additional $100 million for the program from the Wireless Innovation and Infrastructure Initiative for a total of $650 million. ARPA-E was launched in FY 2009 to sponsor specific high-risk and high-payoff transformational research and development projects that overcome the long-term technological barriers in the development of energy technologies to meet the Nation's energy challenges, but that industry will not support at such an early stage. An essential component of ARPA-E's culture is an overarching focus on accelerating science to market. Beyond simply funding transformational research creating revolutionary technologies, ARPA-E is dedicated to the market adoption of those new technologies that will fuel the economy, create new jobs, reduce energy imports, improve energy efficiency, reduce energy-related emissions, and ensure that the U.S. maintains a technological lead in developing and deploying advanced energy technologies.

Office of Energy Efficiency and Renewable Energy: Investing in Breakthrough Technology and a Clean Energy Future

The Office of Energy Efficiency and Renewable Energy (EERE) supports research, development, demonstration, and deployment activities on technologies and practices essential for meeting national security goals by reducing dependence on oil, meeting environmental goals by minimizing the emissions associated with energy production and use, and stimulating economic growth and job creation by minimizing the cost of energy services. The EERE portfolio emphasizes work areas where the potential impact is largest, where Federal funds are most critical. It balances investments in high-risk research with partnerships with private firms that speed the translation of innovations into practical business opportunities. The diverse set of technologies supported helps ensure that the U.S. has many options for meeting its energy goals. Program management is designed to identify the best groups in the country to address these challenges and supports work in universities, companies, national laboratories, and consortia.

The FY 2012 budget request of $3.2 billion, the increase of 44.4% over the FY 2010 current appropriation, is aimed at accelerating innovation and change in the Nation's energy economy. The request includes programs associated with meeting the President's goals of investing in the next generation of clean energy technologies, vehicles and fuels, and energy efficiency measures that reduce energy use in Federal agencies and the industrial and building sectors.

Clean, Renewable Energy Generation

The FY 2012 budget request continues to work to transform the Nation's energy infrastructure by investing over $1,164.9 million in a variety of renewable programs including solar ($457.0 million), wind ($126.9 million), water ($38.5 million), hydrogen ($100.5 million), biomass ($340.5 million), and geothermal ($101.5 million). Research, development, and deployment of these technologies will reduce the production of greenhouse gas emissions and revitalize an economy built on the next generation of domestic production. The request includes the solar SunShot program which will invest in transformative research focusing on achieving radical cost reductions in photovoltaic modules, balance of systems, and power electronics.

Energy Efficiency

The Department implements a number of efforts to increase energy efficiency in homes, transportation, and industry. The FY 2012 budget requests $1,805.3 million to accelerate deployment of clean, cost-effective, and rapidly deployable energy efficiency measures in order to reduce energy consumption in residential and commercial buildings, and the industrial and Federal sectors. The Department will invest $470.7 million in the Building Technologies program and $33.0 million for the Federal Energy Management Program. Federal assistance for state-level programs such as State Energy Program ($63.8 million), Tribal ($10.0 million) and Weatherization Assistance Program ($320.0 million) will continue to help citizens implement energy efficiency measures, lower energy costs and greenhouse gas emissions, and build a technical workforce. ($319.8 million) for Industry will provide a balanced portfolio of advanced R&D and pursuit of near-term low cost opportunities with the objectives of increasing U.S. competitiveness, enhancing clean energy manufacturing, and improving energy productivity. There will be a focus on next generation manufacturing processes and materials, activities for clean energy manufacturing, and refocused efforts for Industrial Technical Assistance to achieve greater results with less funding through more effective leveraging of funding for deployment partnerships. A new Energy Innovation Hub on critical materials will be competed through the Industrial Technologies program. The FY 2012 request also includes $588 million to accelerate research, development and deployment of advanced vehicle technologies, working in concert with biomass RD&D to reduce the use of petroleum and greenhouse gas emissions.

Better Buildings Initiative for Commercial Energy Savings – The President's Better Buildings Initiative is focused on achieving a 20 percent improvement in commercial buildings' energy use by 2020. The initiative will include many new components to achieve this goal. The following are supported in the Department's FY 2012 request: launch of the Race to Green competitive grant program for states and municipal governments to encourage higher standards for commercial energy efficiency, which is funded within the Buildings Technologies Program; a new pilot loan guarantee program to support energy efficiency retrofits for buildings that serve as community assets; and increased R&D funding for building technologies. The Department intends to work with the business and academic communities to make their organizations leaders in saving energy.

Office of Electricity Delivery and Energy Reliability: Enabling a Clean Energy Economy

The Office of Electricity Delivery and Energy Reliability (OE) is responsible for leading national efforts to modernize the electric grid, enhance the security of energy infrastructure, and facilitate recovery from disruptions to the energy supply. The Department's FY 2012 budget request for OE of $238 million, a 38% increase over the FY 2010 appropriation, represents a clear and determined effort to accelerate the transformation of one of the Nation's key enablers of a clean energy economy – the electricity delivery system.

The U.S. electricity delivery system was built on technology that was developed early in the 20th century and designed for the demands and challenges of that era. Today, this aging and often congested system is facing many new and complex challenges that require considerable improvements in the physical and technological components of the system. In order to alleviate the stress on the system from increasing demand for electricity and to enable greater use and integration of renewable and distributed resources, all while maintaining the reliability, security, and affordability of electric power, research and development breakthroughs and new energy management approaches are critical in the areas of transmission and distribution, energy storage, and cyber security.

OE's FY 2012 budget request provides $193 million for research and development in these critical areas to bring the next generation of grid technologies closer to deployment and commercialization. The increased investment reflects the President's vision and OE's role in competing in a worldwide technological race. As such, with $20 million in FY 2012, OE will establish a new Energy Innovation Hub, or in the words of President Obama, one of "the Apollo projects of our time." The Smart Grid Technology and Systems Hub will bring together a diverse, multi-disciplinary group to develop an integrated approach to enhancing smart grid technologies and systems. OE will also expand its advanced modeling capabilities to include other system layers in order to provide a more in-depth system understanding. The energy storage program will expand to aggressively support the deployment of grid-scale energy storage technologies with new demonstrations, and the cyber security program will continue to focus on the development and integration of secure control systems.

The budget request continues to support Permitting, Siting, and Analysis (PSA) with $8 million to develop and improve policies, state laws, and programs that facilitate the development of electric infrastructure needed to bring new clean energy projects to market, and to provide technical assistance to states and regions. It also supports Infrastructure Security and Energy Restoration (ISER) with $6.2 million to enhance the reliability and resiliency of critical energy infrastructure and to facilitate recovery from energy supply disruptions.

Office of Environmental Management: Meeting Commitments and Making Progress

The mission of the Office of Environmental Management (EM) is to complete the safe cleanup of the environmental legacy brought about from over six decades of nuclear weapons development, production, and Government-sponsored nuclear energy research. This cleanup effort is the largest in the world, originally involving two million acres at 110 sites in 35 states, dealing with some of the most dangerous materials known to man.

EM continues to pursue its cleanup objectives within the overall framework of achieving the greatest comparative risk reduction benefit and overlaying regulatory compliance commitments and best business practices to maximize cleanup progress. To support this approach, EM has prioritized its cleanup activities:

- Activities to maintain a safe and secure posture in the EM complex
- Radioactive tank waste stabilization, treatment, and disposal
- Spent nuclear fuel storage, receipt, and disposition
- Special nuclear material consolidation, processing, and disposition
- High priority groundwater remediation
- Transuranic and mixed/low-level waste disposition
- Soil and groundwater remediation
- Excess facilities deactivation and decommissioning

The FY 2012 budget request for $6.13 billion will fund activities to maintain a safe and secure posture in the EM complex and make progress against program goals and compliance commitments by reducing the greatest risks to the environment and public health, using science and technology to reduce lifecycle costs, and reducing EM's geographic footprint by 90 percent by 2015. EM continues to move forward with the development of the capability for dispositioning tank waste, nuclear materials, and spent (used) nuclear fuel. The budget request includes the construction and operation of three unique and complex tank waste processing plants to treat approximately 88 million gallons of radioactive tank waste for ultimate disposal. It will also fund the solid waste disposal infrastructure needed to support disposal of transuranic and low-level wastes generated by high-risk activities and the footprint reduction activities.

EM carries out its cleanup activities with the interests of stakeholders in mind. Most importantly, EM will continue to fulfill its responsibilities by conducting cleanup within a "Safety First" culture that integrates environment, safety, and health requirements and controls into all work activities to ensure protection to the workers, public, and the environment, and adheres to sound project and contract management principles. EM is also strengthening its project and planning analyses to better assess existing priorities and identify opportunities to accelerate cleanup work. Working collaboratively with the sites, EM continues to seek aggressive but achievable strategies for accelerating cleanup of discrete sites or segments of work. In addition, functional and cross-site activities such as elimination of specific groundwater contaminants, waste or material processing campaigns, or achievement of interim or final end-states are being evaluated.

After the EM program completes cleanup and closure of sites that no longer have an ongoing DOE mission, post closure stewardship activities are transferred to the Office of Legacy Management (LM). LM also receives sites remediated by the U.S. Army Corps of Engineers (Formerly Utilized Sites Remedial Action Program) and private licensees (Uranium Mill Tailings Radiation Control Act, Title II sites). Post closure stewardship includes long-term surveillance and maintenance activities such as groundwater monitoring, disposal cell maintenance, records management, and management of natural resources at sites where active remediation has been completed. At some sites the program includes management and administration of pension and post-retirement benefits for contractor retirees.

Loan Programs Office: Helping Finance Clean Energy Deployment

Innovative Technology Loan Guarantee Program - To encourage the early commercial deployment of new or significantly improved technologies in energy projects, the Department requests up to $36 billion in loan guarantee authority for nuclear power facilities and $200 million in appropriated credit subsidy to support an estimated $1 to $2 billion in loans for renewable energy system and efficient end-use energy technology projects under section 1703 of the Energy Policy Act of 2005. The additional loan guarantee authority for nuclear power projects will promote deployment of new plants and support an increasing role for private sector financing. The additional credit subsidy will allow for investment in the innovative renewable and efficiency technologies that are critical to meeting the Administration's goals for affordable, clean energy, technical leadership, and global competitiveness.

The FY 2012 budget also requests $38 million to evaluate applications received under the eight solicitations released to date and to ensure efficient and effective management of the Loan Guarantee program. This request is expected to be offset by collections from borrowers authorized under Title XVII of the Energy Policy Act of 2005 (P.L. 109-8).

Advanced Technology Vehicle Manufacturing Program - The Department requests $6 million to support ongoing loan monitoring activities associated with the program mission of making loans to automobile and automobile part manufacturers for the cost of re-equipping, expanding, or establishing manufacturing facilities in the United States to produce advanced technology vehicles or qualified components, and for associated engineering integration costs.

Better Buildings Pilot Loan Guarantee Initiative for Universities, Schools, and Hospitals - To spur investment in energy efficiency retrofits for buildings which serve as assets to our communities, the Department requests $100 million for loan guarantee subsidy costs to support up to $2 billion in loan authority for universities, schools, and hospitals. This pilot program is one component of the President's Better Buildings Initiative and would fund cost-effective technologies and measures to assist universities, schools, and hospitals save on energy usage and associated energy costs. The Department also requests $5 million for administrative expenses to carry out the program. The request is subject to the enactment of legislation authorizing this program.

Office of Nuclear Energy: Investing in Energy Innovation and Technical Leadership

The Department is requesting $852.5 million for the Office of Nuclear Energy (NE) in FY 2012 – a decrease of 0.6 percent from the FY 2010 current appropriation. NE's funding supports the advancement of nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate.

Currently, nuclear energy supplies approximately 20 percent of the Nation's electricity and over 70 percent of clean, non-carbon producing electricity. Over 100 nuclear power plants are offering reliable and affordable baseload electricity in the United States, and they are doing so without air pollution and greenhouse gas emissions. NE is working to develop innovative and transformative technologies to improve the competitiveness, safety and proliferation resistance of nuclear energy to support its continued use.

The FY 2012 budget supports a balanced set of research, development, and deployment (RD&D) activities. This program is built around exploring, through its R&D technology and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors; improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals; development of sustainable nuclear fuel cycles; and minimization of risks of nuclear proliferation and terrorism.

NE is requesting $125 million for Reactor Concepts Research, Development and Demonstration. This program seeks to develop new and advanced reactor designs and technologies. NE is also requesting $67 million for the Light Weight Reactor SMR Licensing Technical Support program, which will support cost-shared design certification and licensing activities for two light water reactor-based designs. Small modular reactors are a technology that the Department believes has the promise to help meet energy security goals. Work will continue on R&D for the Next Generation Nuclear Plant to support demonstration of gas-cooled reactor technology in the United States. The program also supports research on Generation IV and other advanced designs and efforts to extend the life of existing light water reactors.

The FY 2012 request includes $155 million for Fuel Cycle Research and Development to perform long-term, results-oriented science-based R&D to improve fuel cycle and waste management technologies to enable a safe, secure, and economic fuel cycle. The budget also requests $97.4 million to support the Nuclear Energy Enabling Technologies program, focused on the development of cross-cutting and transformative technologies relevant to multiple reactor and fuel cycle concepts. The Crosscutting Technology Development activity will focus on a variety of areas such as reactor materials, creative approaches to further reduce proliferation risks, and establishing advanced modeling and simulation capabilities to complement physical experimentation. The Transformative Nuclear Concepts R&D activity supports, via an open, competitive solicitation process, investigator-initiated projects that relate to any aspect of nuclear energy generation ensuring that good ideas have sufficient outlet for exploration. Modeling and Simulation Energy Innovation Hub, supported within this program, will apply existing modeling and simulation capabilities to create a "virtual" reactor user environment to simulate an operating reactor and is a prime example of the type of crosscutting, transformative activity that will enhance many research areas within NE. NE will also continue its commitments to investing in university research, international cooperation, and the Nation's nuclear research infrastructure – important foundations to support continued technical advancement.

Office of Fossil Energy: Sustaining American Energy Options through U.S. Ingenuity

The FY 2012 budget request of $521 million for the Office of Fossil Energy (FE) will help ensure that the United States can continue to rely on clean, affordable energy from traditional domestic fuel resources. The United States has 25 percent of the world's coal reserves, and fossil fuels currently supply over 80 percent of the Nation's energy.

The Department is committed to developing technologies and providing technology-based options having public benefits including enhanced economic, environmental and energy security impacts. In FER&D, the emphasis, in keeping with Presidential priorities, is in supporting long-term, high risk initiatives targeted at carbon capture and storage as well as advanced energy systems and on cross-cutting research.

In addition, $122 million of FE's $521 million request will be to provide for national energy security through the continued operations of the Strategic Petroleum Reserve. The budget proposes to sell $500 million of SPR oil in order to provide operational flexibility in managing the Reserve.

The National Nuclear Security Administration: Leading Global Partners on Nonproliferation by Securing Vulnerable Nuclear Materials; Reaffirming Commitment to Stockpile Modernization

The National Nuclear Security Administration (NNSA) continues significant efforts to meet Administration and Secretarial priorities, leveraging science to promote U.S. national security objectives. The FY 2012 President's budget request for NNSA is $11.8 billion; an increase of 5.1 percent from the President's FY 2011 Request. The five-year FY 2012-2016 President's Request for the NNSA reflects the President's global nuclear nonproliferation priorities and his commitment to modernize the U.S. nuclear weapons complex and sustain a strong nuclear deterrent, as described in the 2010 Nuclear Posture

Review (NPR) Report, for the duration of the New START Treaty and beyond. The NNSA's defense and homeland security-related objectives include:

- Ensure that the U.S. nuclear deterrent remains safe, secure and effective while implementing changes called for by the 2010 NPR and the New START Treaty
- Broaden and strengthen the NNSA's science, technology and engineering mission to meet national security needs
- Transform the Nation's Cold-War era weapons complex into a 21st century national security enterprise
- Work with global partners to secure all vulnerable nuclear materials around the world and implement the President's nuclear security agenda expressed in the May 2010 National Security Strategy and the Nuclear Posture Review report
- Provide safe and effective nuclear propulsion for U.S. Navy warships

The FY 2012 budget request of $7.6 billion for the Weapons Activities appropriation provides funding for a wide range of programs. Requested activities include providing direct support for the nuclear weapon stockpile, including stockpile surveillance, annual assessments, life extension programs, and warhead dismantlement. Science, Technology and Engineering programs are focused on long-term vitality in science and engineering, and on performing R&D to sustain current and future stockpile stewardship capabilities without the need for underground nuclear testing. These programs also provide a base capability to support scientific research needed by other elements of the Department, the federal government national security community, and the academic and industrial communities. Infrastructure programs support facilities and operations at the government-owned, contractor-operated sites, including activities to maintain and steward the health of these sites for the long term and construct new facilities that will allow the United States to maintain a credible nuclear deterrent. The unique nuclear security expertise and resources maintained by NNSA are made available through the National Laboratories to other Departmental offices, agencies and to the Nation for security and counterterrorism activities.

The Weapons Activities request is an increase of 8.9 percent over the President's FY 2011 Request. This level is sustained and increased in the later outyears. The multi-year increase is necessary to reflect the President's commitment to maintain the safety, security and effectiveness of the nuclear deterrent without underground nuclear testing, consistent with the principles of the Report on the Plan for the Nuclear Weapons Stockpile, Nuclear Weapons Complex, and Delivery Platforms (known as the "1251 Report") and the Stockpile Management Program as stipulated in Sections 1251 and 3113(a)(2) of the National Defense Authorization Act of Fiscal Year 2010. Increases are provided for direct support of the nuclear weapon stockpile, for scientific, technical and engineering activities related to maintenance assessment and certification capabilities, and for recapitalization of key nuclear facilities. The President's Request provides funding necessary to protect the national resource of human capital at the national laboratories through a stockpile stewardship program that exercises and retains these capabilities.

The FY 2012 request for Defense Nuclear Nonproliferation (DNN) is $2.5 billion; a decrease of 5.1 percent from the President's FY 2011 Request. This decrease reflects completion of long-lead procurements for the Mixed Oxide Fuel Fabrication Facility (MOX) and Waste Solidification Building (WSB). It also reflects our decision to await an agreement between the U.S. and Russia on detailed implementation milestones prior to requesting additional U.S.-pledged funding to support Russian plutonium disposition. The Administration prioritizes U.S. leadership in global nonproliferation initiatives as directed through the National Security Strategy and has advanced this agenda through commitments from global partners during the 2010 Nuclear Security Summit. In addition to the programs funded solely by the NNSA, Defense Nuclear Nonproliferation programs support interagency and international efforts to protect national security by preventing the spread of nuclear weapons and nuclear materials to terrorist organizations and rogue states. These efforts are implemented in part through the International Atomic Energy Agency, the G8 Global Partnership against the Spread of Weapons and Materials of Mass Destruction, and the Global Initiative to Combat Nuclear Terrorism.

DNN supports the President's goal to secure vulnerable nuclear materials around the world within four years. The Global Threat Reduction Initiative's emphasis in FY 2012 is to convert domestic and international nuclear reactors from weapons-usable highly enriched uranium fuel to low-enriched uranium fuel (LEU); while preserving our capability to produce the critically needed Molybdenum 99 isotope. The FY 2012 President's request for International Nuclear Materials Protection and Cooperation reflects selective new security upgrades to buildings and sites in accordance with the President's goal to secure vulnerable nuclear materials around the world within four years, as well as enhancements and sustainability support for previous work. The Fissile Materials Disposition program continues domestic construction of the MOX Fuel Fabrication Facility scheduled to come online in 2016; and design for the pit disassembly and conversion capability to provide it with plutonium oxide feedstock.

The President's request of $1.2 billion for Naval Reactors is an increase of 7.8 percent over the President's FY 2011 Request. The program supports the U.S. Navy's nuclear fleet, comprised of all of the Navy's 72 submarines and 11 aircraft carriers, which constitute 45 percent of the Navy's combatants. The U.S. relies on these ships every day, all over the world, to protect our national interests. The budget provides funding increases for the Ohio Class Replacement submarine to design and develop required submarine reactor plant technologies. R&D is underway now, and funding during this Future Years Nuclear Security Program is critical to support the long manufacturing spans for procurement of reactor plant components in 2017, and ship construction in 2019. Resources are also requested in FY 2012 to support design work for the recapitalization of the spent nuclear fuel handling infrastructure and refueling of the Land-based prototype.

The Office of the Administrator appropriation provides for federal program direction and support for NNSA's Headquarters and field installations. The FY 2012 request is $450.1 million; a 0.4 percent increase over the President's FY 2011 Request. This provides for well-managed, inclusive, responsive, and accountable organization through the strategic management of human capital, enhanced cost-effective utilization of information technology, and integration of budget and performance through transparent financial management practices. The increase reflects additional federal oversight for construction of the Pit Disassembly and Conversion project, the Uranium Processing Facility, and the Chemistry and Metallurgy Research Replacement Facility.

Mr. FRELINGHUYSEN. Thank you, Mr. Secretary. Mr. Pastor alluded to the talking heads, people weighing in on the incredible, horrendous disaster in Japan. What are the facts as you know them?

Secretary CHU. There were a number of reactors closed. There are three reactors that are damaged. Of those three reactors that we know to be damaged, there have been releases. There have been hydrogen explosions in three of them. There have been releases of steam that also had with it small amounts of radiation in the form of gases. There was an incident last night we are not fully—there are conflicting reports, but the one last night appears to be more serious than that and we are trying to get on top of that.

Mr. FRELINGHUYSEN. So there have been radioactive releases? Part of our teams are in there monitoring some of those releases?

Secretary CHU. That is right.

Mr. FRELINGHUYSEN. International attention is focused here. We have got everybody on the ground.

Secretary CHU. Right. We have two people onboard. There are at least several people in the RC. There are two people that have been forward deployed several days ago from the Department of Energy, and my understanding is 3:00 a.m., not last 3:00 a.m. but the 3:00 a.m. before that, we were supposed to airlift more people, an additional 33 people or 32 people with more elaborate monitoring equipment for the Japanese and for ourselves.

Mr. FRELINGHUYSEN. Those releases obviously have people greatly concerned. How would you characterize the releases there, their immediate effect on the people who live in those areas as well as potentially their effect through the traveling of air or in one form or the other to our continent?

Secretary CHU. What was reported by the Japanese government was that there is material that shows that some of the core has been damaged. There is detection of isotopes like iodine, strontium and cesium that shows that at least there must have been some fuel rod damage because those elements are an integral part of the fuel rods. So there has been release of those materials. Again the newspapers are reporting and saying that now in the local vicinity of the reactor only the very essential people who are helping pump water in and for emergency actions like that are remaining, and then there is evacuation for I think it is 20 miles now.

Mr. FRELINGHUYSEN. Lastly, as we look here at the next generation of nuclear reactors, tell us, and I am sure we are addressing the very safety concerns that are obviously the focus of individuals and countries worldwide, as we look ahead to our own investments, what this administration is supportive of.

Secretary CHU. I think the world learns a lot from each new incident. I think the United States nuclear reactor safety learned a lot from the Three Mile Island accident and we are ever increasing our vigilance and improving the safety not only of our nuclear energy but of all of our sources of energy. And so we first and foremost are focused right now on helping in any way we can the Japanese government and the power company to contain—cool down the reactors, contain it and stop the leaking.

The next step after that is to try to understand deeply what happened and then to look at our own reactors. We in the United

States typically look at nuclear reactors and we clearly consider things like tsunamis and earthquakes and fires and all of these other concerns.

Mr. FRELINGHUYSEN. We have been doing that?

Secretary CHU. We have been doing that all the time, and whenever there is a reactor near an earthquake site we look to what is the maximum size of that particular earthquake that ever happened and we design considerably above that. So we are very focused on the safety of our nuclear reactors, both the current operating reactors and those that go in in the future.

Mr. FRELINGHUYSEN. Thank you. Mr. Pastor.

Mr. PASTOR. Thank you, Mr. Chairman. As I recall as we were finishing up the Energy and Water Bill last year, there was concern on the nuclear loan guarantees. At that time there were four, I guess, potential nuclear reactors in the pipeline. We negotiated several times in terms of lessening the amount for the loan guarantees and changes were made with the companies themselves that were requesting the loan guarantees. What is the status today of the companies that were in the pipeline, where are they today and how do you see the future here fairly soon?

Secretary CHU. The first loan was a conditional loan that was offered to two plants, the Vogel site, two reactors at the Vogel site. I believe that is continuing. It is a conditional loan on many things, including the NRC approval of the site and safety and so that is continuing. There were two other near-term companies or conglomerates I should say that we were working with and one of them because of the lower gas prices and the anticipated lower gas prices in the next 10 to 20 years. One of the partners is now looking for another partner so there are other factors involved in this. Clearly what is going to happen now is I think everybody is going to be looking very hard to make sure going forward that these things will be safe. To have those assurances the Texas Group is also working on this and so these are very significant investments of capital and everybody wants to make sure that there will be no safety concerns going into the future and also that there will be good, sound financial investments.

There is another tranche. There is the first set of four. I cannot give you the exact status of that fourth one. And then there is another tranche of four that would be in the queue but they are further away from going into deep due diligence, so that is the status as I know.

Mr. PASTOR. From your testimony, out of the four that we were considering last year, one has dropped out, one is going forward and two are still viable?

Secretary CHU. No. I do not know. I would not say dropped out. That is too strong a word.

Mr. PASTOR. I thought they had changed their mind and were going to go to natural gas.

Secretary CHU. That may be so. Then two are still viable but those conditional commitments have not yet been made and we are working toward those.

Mr. PASTOR. When we compare our effort here in the United States with India and China, where are we in terms of nuclear power?

Secretary CHU. My understanding is for example in China, worldwide there are roughly 50 nuclear power plans now under construction where ground has been broken. My understanding also is that roughly half of those, 25, are in China. India also wants to aggressively ramp up their deployment of nuclear reactors.

Mr. PASTOR. The reactors that we have seen in Japan, they are the class of 1971, and they are pressurized water. Is that right?

Secretary CHU. Boiling water.

Mr. PASTOR. Boiling water reactors. The ones that are in the queue in the United States, what types of reactors are we talking about?

Secretary CHU. The one, for example the Vogel plant—wanting to build a new type of reactor called a Westinghouse AP1000. It is much more passively safe. This is what the Department of Energy and the industry are driving toward. If you lose total control as we have seen in Japan, that there is no chance of a meltdown. This new generation of reactor is not quite there yet but it is much more safe in the sense that it does not require numerous backup systems to keep it going. It is inherently much safer. There is a lot of water circulating in the core itself that keeps it from overheating. So that is what we are going for.

But having said that, we also have a responsibility and obligation to an existing fleet of 104 reactors and to make sure those too are safe. Again, I think this is the duty of the NRC, the Nuclear Regulatory Commission, and we have a very good system in the United States where the institution responsible for safety is actually separate from the Department of Energy. It is really a quasi-independent organization that oversees safety. It has the ability to shut down reactors whenever it thinks any reactor no matter what vintage poses risks to the public.

Mr. PASTOR. Obviously in Japan we still do not know the final outcome and we are working very hard to ensure the safety of the Japanese people and we are doing everything we can to cool down the reactors.

Secretary CHU. Yes.

Mr. PASTOR. But obviously there is at least one effort here in the United States to continue going forward with the initial plans to possibly construct a new plant. What would be your recommendation to us in terms of do we shut down everything and say we are not going to look at anything or continue going forward but with caution? What would be your recommendation to us in this area of nuclear energy?

Secretary CHU. I think whenever there is an incident such as what is happening in Japan, we have to pay very close attention to that and think very hard about how to proceed forward. Whenever there is any accident of this type in any form of energy, the world looks at it very closely, learns lessons from that, develops better procedures and can proceed ahead in a much safer way. This is an ever-increasing process that we have had in all forms of energy that we use and we will continue to do this. This is certainly a very serious incident and we first have to find out what are the root causes. This was a double-barrel whammy as they say. This was I believe the fourth-largest earthquake in recorded history, very, very close to the site and I know in the United States, we plan for that in any site that is near a fault or any near the ocean. We do plan for this combination. So we are just going to continue to monitor the situation, find out what lessons we could learn and then proceed from there.

Mr. PASTOR. I yield back, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Pastor. Mr. Lewis.

Mr. LEWIS. Thank you, Mr. Chairman. Mr. Secretary, when you planned for this hearing I assume you thought the lines of questioning would be entirely different than are before us today. We never quite anticipate a tragedy of this kind. But as you suggest, we indeed can learn from the experiences of others as we go forward with our own planning and in connection with that I must ask about the California facilities. As you suggested, we have attempted to design well above maximum kinds of circumstances that might develop and indeed at both the San Onofre and the Diablo Canyon facilities, we are looking to very real prospects of serious circumstances somewhere down the line. I must mention that the two faults that are involved that could relate to earthquake prospects are the San Andreas Fault and the Cascadia Fault. The San Andreas runs from northern California through the southland. I think my home in southern California is almost exactly on top of the San Andreas Fault so we pay some attention to that matter.

But from there, the Cascadia Fault I am learning a lot more about than I ever thought I would, but it is some 50 miles offshore. It has been dormant for something in the neighborhood of 300 years. Interestingly enough, it has been dormant for some years but at both San Onofre as well as the Diablo Canyon site, they have what would appear to be anti-tsunami walls built around them, some 30 meters.

Secretary CHU. Three feet?

Mr. LEWIS. Thirty-two feet or something like that. Yes. That is kind of astonishing to me. Do you have any idea if there is a need for examining the safety of those two facilities? Have people begun to ask questions as to whether we should consider retrofitting those two sites, et cetera?

Secretary CHU. Certainly. First when the earthquake occurred in Japan and there was the tsunami warning, one of the first things the Department of Energy and the NRC did is we looked at what impacts they could have on the West Coast. I know in the Diablo Canyon site, their wall is designed for a 30-foot tsunami. It is built a little higher. The water intake—it is built away from the water intake and higher. As I said, my knowledge is that what you do when we site earthquakes and design for them in the U.S., the geologists and geophysicists, what is the maximum depending on where it is on the fault, what is the maximum earthquake that could be in that region and then you design well over that region. I think my recollection is, I can get you the exact numbers, they design 7.5 where the maximum might have been 6.2. That is more than a factor of 30 increase in energy safety. So those considerations are taken seriously. The fuel for the backup diesel is underground. I know less about the one near you. I too lived near faults. When I was at Stanford that was about a mile or two away from the San Andreas, and when I was in Berkeley I was about 100 yards from the Hayward Fault.

Mr. LEWIS. They still want to build new facilities on that fault.

Secretary CHU. On which fault?

Mr. LEWIS. When I visited those labs there were some issues relative to the proximity. They still wanted to proceed.

Secretary CHU. Not nuclear reactors. I should also say that we have learned a lot and this shows how we have progressed in terms of earthquakes. If you look, we have had a number of very serious earthquakes both in the United States and in Japan, with the Los Angeles earthquake, the large earthquake in the Bay Area and then the Kobe earthquake, and with each earthquake we go back and we look at how the buildings we do have and any new buildings are structured. And in this one again the fourth-largest in recorded history, we had a lot of skyscrapers that wiggled around and nothing fell down off these very large buildings. So it shows that we are learning and as we go forward we continue to improve upon the resilience to these very terrible natural disasters.

Mr. LEWIS. Secretary Chu, it is pretty obvious that we are going to have to proceed with a comprehensive energy policy that will reach across the board. It is suggested by some experts and otherwise, commentators, that the experience in Japan will essentially put brakes on for some considerable length of time any nuclear development in the United States and perhaps even take it off the board. I am sure that you have discussed those prospects. If we were to put the brakes on and it lasted for some extended period of time, let us say a decade, what would that do to our challenges in terms of developing energy independence here at home?

Secretary CHU. Let us go back to the first principles. I think the United States, this I agree wholeheartedly with the Chairman, the United States needs a diverse supply of energy, that we cannot depend on a single course of energy both for electricity and I might add for transportation fuel, that we need to diversify all of those sources of energy. And so we still believe that despite the tragedy in Japan we can learn lessons. We can go back and look at the nuclear reactors, the existing nuclear reactors at home, and it is certainly our responsibility. We have to take a hard look. Were there any lessons learned from this tragedy that can further improve the safety of our existing reactors? As I said before, anytime a terrible natural disaster or even human-caused disaster occurs, you always go back and you look and you improve. And so we still feel that we should go back, look and improve this but I still feel that it is probably premature to say anything except we will learn from this. Again, the general principle is that ore-based forms of energy right now do present risks.

Mr. LEWIS. I understand that General Electric may have as many as 200 facilities located around the world that are essentially the same design as that which Japan has in place. That would suggest to me that General Electric must have major teams with sophisticated development of tactic, strategy and otherwise to respond in the event of a tragedy. Do they have such teams or a team, and can you tell us how they responded——

Secretary CHU. Well, I cannot actually speak to the details of how General Electric is responding. Certainly they have a lot of engineers that are, I am sure, in contact with the Japanese power company, Japanese government.

Mr. LEWIS. I, frankly, would suggest that we have got a private sector involved in developing these energy resources, they certainly ought to be at the center of the what if questions and response procedures relative to those questions.

Secretary CHU. No, I am confident that they are because, after all, as you said, they are the company that designed these reactors and they are experts on that. I mean we have many experts in the United States, but certainly General Electric is—certainly has detailed expert knowledge of their boiling water reactors.

Mr. LEWIS. If our experts were looking at what if scenarios, I would think they would want to know precisely what GE thinks, what they have done, how they would react, and if we are not asking those questions, I would ask why not?

Secretary CHU. Well, I do know in the United States, we do ask those questions of reactors, and you have systems and you have backup systems and then you have interacting systems. And I do know there are some critical systems, but there is also a lot of attention paid to those systems which may not be considered critical, but if they fail, could interact, there will be non-essential materials that could fall down on essential materials. And so part of the safety requirements that the NRC does very well is, they ask deeply those questions about how very complex systems interact and how a failure of something that might not have been considered important does become important. And so, again, as we learn more about what actually happened in the earthquake plus tsunami, we will learn some more and then proceed from there.

Mr. LEWIS. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Mr. Fattah.

Mr. FATTAH. Mr. Secretary, good morning. This morning I spoke to the president of Temple University in Philadelphia, they have a campus there in Japan, and they were telling me that the students are now being moved out to Okinawa and they are going to be housed there at the university until further assessments can be made. As you know, the challenge here is, as we review this from a distance is that obviously the Japanese government is handling the situation, and I know that we are providing whatever assistance that we can provide. Can you outline for the Committee what assistance actually is being provided or has been requested?

Secretary CHU. Sure. First, I talked to the Medi minister today, this morning. He first said that some firefighting equipment has been—U.S. firefighting equipment has been used, and they were very grateful to put out a fire. He did not specify which one. We have—I just got a note, it is due to arrive in approximately two hours, a great deal of monitoring equipment that can be used by the Japanese. It includes airborne equipment that you can put in airplanes.

Mr. FATTAH. Is this to monitor radiation?

Secretary CHU. The radiation and radiation release, the type of release. We also have ones that could be deployed underground so that we can be sure that whatever does get released, if it begins to go in the direction of major metropolitan areas, that we can give people fair warning. This is something that the Japanese discovered also and so they were very grateful that we are putting that at their disposal.

Mr. FATTAH. Well, obviously I think that the Committee would want you to know that no expense should be spared in trying to help alleviate this tragedy. Let me move on. I traveled with the Chairman to the Nuclear Weapons Lab in New Mexico, and I note in your request that there are over $7 billion in terms of stewardship of the stockpile, modernization of the stockpile, and obviously our nuclear proliferation issues.

One of the issues that became clear, and this is maybe relevant to other parts of your Department, is the pay freeze that has been ordered by the President may not be as helpful as we may want in terms of retaining some of the critical skills necessary for both the modernization efforts and the stewardship efforts relative to our nuclear weapons stockpile.

So I would hope that you would take a look at that as it might apply to issues related to national security, because I would assume that one of the objectives of the freeze was to somehow take into account these national security issues.

I also am interested in the work of the Department relative to the nuclear loan guarantee. So under President Reagan, both Bushes, and Clinton, we had no nuclear building efforts in our country. For 30 years we built no nuclear plants. Under the Obama Administration, we finally have an administration that actually wants to proceed with making sure that nuclear is part of the diversity of energy resources in the country. And through the loan guarantee program, which I and others on the Committee have championed, you started to move to a decision point on not just one, but hopefully a number of—maybe four, as Ranking Member Pastor indicated, projects.

And now we have this tragedy in Japan, and obviously we want to learn from it, but we also have learned a few things over the last 30 years by not attempting to make nuclear a significant part of our supply. We have seen France move very aggressively in this area, we have seen other countries like China move in this area, and we have seen our dependence on foreign supplies of energy increase.

So I think that, at least for myself, I am interested in us learning and applying whatever safety techniques we can, given what has happened, but I also believe that we should not be deterred from trying to think through and implementing a very diversified portfolio of energy supplies. A portfolio you indicated will be necessary for the country in the future.

So I know that this is a tragic moment, but even in the midst of it, I do not think that we should shrug from our responsibility to move forward. I am happy to see an administration actually committed to doing something in an area where all of the talk over the last 30 years, where we have done literally nothing. And then we also have more than 100 nuclear facilities already operating, and you have mentioned that, we need to make sure that they are safe. However, as a country, I cannot imagine how we go forward, even with our push for renewables and everything else, if we do not have nuclear in the mix.

Finally on the subject of innovation, we have learned through the great work of your nuclear labs in Albuquerque and the Sandia Lab that there are already innovative things going on. So I want to congratulate you, and note a major push in the budget on innovation. So I thank the Chairman and my traveling companion, Mr. Simpson, for the lessons that I have learned. Thank you.

Mr. FRELINGHUYSEN. Thank you, Mr. Fattah. Mr. Simpson representing Idaho.

Mr. SIMPSON. And I noticed you could have mentioned the Idaho Lab, too, when you mentioned Sandia.

Mr. FATTAH. I figured you could do that.

Mr. SIMPSON. Thank you, I appreciate that very much. Not so much a question, first a statement. I have said it before in other committees, in other hearings of this Committee, and I will say it again and probably keep saying it, as we try to reduce spending and address our deficit as this Congress is committed to doing, we have pretty much exempted out Defense, Homeland Security, Veterans Affairs, three agencies that I think most people agree are pretty important. It is important that we recognize that in this budget there is about, as I look at it, about 40 percent of it is actually national defense stuff, whether it is the NNSA, whether weapons activity or nonproliferation or other things, that when the Budget Committee and when the full Committee looks at the 302(b) allocations, we need to recognize that much of this budget is, in fact, defense. And that is just a statement that I will keep making because if we do not do that and the Committee does what is necessary, and the NNSA has been requested and so forth, we focus the cuts in smaller and smaller areas of the budget, which causes me a great deal of concern.

Your budget this year has a lot of different programs and ideas, whether it is the energy hubs that we want to expand, you have made choices in how you are going to do new research in renewables versus nuclear energy, clean coal technology and those types of things. I have yet to see, two years into the Administration, a strategic plan for the Department. Where is it, when will it be here? Will it be here before we make this budget so that we can pace our budget based on your strategic plan?

Secretary CHU. Well, thank you for the question. Actually, we are releasing a strategic plan, it is a plan we have been working on for two years, it is the beginning of a much more detailed plan. I have tasked the Under Secretary for Science, Steve Koonin, so there is a first strategic plan that has cleared OMB and I think it has been released, and we can get it to you.

There is another plan that was recommended by the Presidential Science Committee, PCAS. Upon my urging, I asked OSDP and PCAS to make recommendations to the Department of Energy as to how we could better serve the country in terms of energy.

They gave us a report, I believe it was in November of last year, and that recommendation was to begin to develop over a series of years, and it will take some time, this whole quadrennial review, just as the Department of Defense over a period of time has developed that, and the State Department.

And so for the first year, I tasked the Under Secretary for Energy, Steve Koonin, to do this. That is also at OMB, and so that is another part. So there is a strategic plan going forward, a series of plans and increasing details.

Mr. SIMPSON. I have a hard time when I look at this budget deciding whether it fits in with our strategic plan in the future. As you know, the Department proposed, I guess it was last year or two years ago, eight science hubs. We decided to fund three of them and see how that goes. Now you have requested funding for three more of them. How are the three going that we have funded already? Are they up and running and in place?

Secretary CHU. Well, we are funding three that we have funded already, but there are three others called Bio-energy Centers that are effectively—the exact same design as the hubs. Those have been going for about three years. The other three have been operational for about a year, and so I think it is too early to tell, but the other three that have been going for three years have a very, very strong record.

Let me give you a few examples of those bio energy hubs. The intellectual property generated from those hubs, and again, it is the same idea, consortia, all working ideally under one roof with industrial participation, university's national labs. They have already developed IP.

The one that I was associated with when I was Director of Lawrence Berkeley National Laboratory has already licensed IP to two companies who are now in the process of designing pilot plants based on that IP, and this is only after three years. These are advanced biofuels, power plants, micro organisms, simply sugar, and they are making drop-in replacement fuels, gasoline, diesel fuel, and jet fuel.

So after three years, we see there is a very quick route to something. It is still research, it is still a demo, these are pilot plants, but we already see the private sector picking it up, moving very rapidly. I talked to one of the companies, they said they think they can produce at a profit and sell diesel fuel at $4 a gallon. I do not know if that is true, but that is a step in the right direction. Once you can sell diesel fuel at a profit of 3.50 or $3 a gallon, that is going to be more than competitive without subsidy. So it is a step in the right direction.

There are, I know in the laboratories, some of these are personal friends of mine, some spectacular results also coming out of the pipeline, so in those instances, very, very good progress. I know Congress said, okay, you asked for eight, we will give you three. Let us wait, but remember, there are these other three, and after three years—three years is about the right time where you expect to see some action. One year I think is a little too early. But because of those successes, we felt that another three would be warranted, and that was our line of thinking.

In fact, what we did is, we were repositioning money within the Department of Energy. We think this is such a high priority we can call from other areas, because——

Mr. SIMPSON. It causes some concerns.

Secretary CHU. It does, but the people who go into these areas have a real sense of urgency, it is a faster route to get it to the private sector, which is ultimately what we want to do.

Mr. SIMPSON. Right.

Secretary CHU. And so it is because of that that we think we are in a race, quite frankly. The country that develops the batteries that can go 300 miles first will be the winner, if you will, of that race, because that 300 miles, that is a mass market, and cost competitive, and so we are literally in a race.

And this is not a race for something that will happen 10 or 15 years from today. This is a race that could even happen within five years. And so this is why it is very important that we win this race. We want to be making these things and selling them worldwide.

Mr. SIMPSON. What is the status of the Department's plan to implement a public private partnership relative to NGNP?

Secretary CHU. This is going forward. I think we are still—we are going to wait until '11; I think '12 will be a final determination year for that. This is the gas cold reactors you are talking about. So in terms of piloting, perhaps in 2012 we will be making a determination.

Mr. SIMPSON. I think, as I look at the Department, the small modular reactor that they are focused on, and the NGNP that I believe is a worthwhile project also, they are kind of competing for limited resources. Is that going to be the case in the future or are we going to have any budget large enough that we can pursue both of what seem to be important technologies?

Secretary CHU. In the near term, most of the funds we are requesting in 2012 is to help a few companies, not just one, but a few companies do the engineering that are needed for the NRC to give them approval.

Then there is a little part of our budget that also is more advanced research within Idaho and other places. And then the NGMP is a little bit further back from the light water reactors, and we are also looking at other designs of small modular reactors.

Small modular reactor is something, as you know, that I still have a lot of confidence in. They are small, contained, they can actually be built underground, and they can be ultimately even safer than the safe reactors we have today, but this is something that we are looking at.

Mr. SIMPSON. If I can ask just one more question?

Mr. FRELINGHUYSEN. One more question, then we go to Mr. Dicks.

Mr. SIMPSON. I have heard comments about other reactors around the country in light of the Tokyo accident that are designed by GE. This, as I understand it, and correct me if I am wrong, this was not a problem with the design of the reactor itself. It might have been a design problem in terms of the total plant and where the redundancy was for the cooling system, the diesel power and that type of thing, but the reactor itself is pretty common technology, is it not?

Secretary CHU. Yes, but it was the combination of the fourth-largest recorded earthquake in history in the near vicinity, plus a 30-foot-high tsunami that took out a lot of the auxiliary equipment, and I think it is that combination of things that has caused this. And again, quite frankly, we have to plan for those combination events.

Mr. SIMPSON. Yes, and just one point. My understanding is, it is not a fundamental design flaw in the GE reactor.

Secretary CHU. Well, it depends on what you mean by that. I think in any reactor built near an earthquake zone or in an earthquake zone, it has to be designed for the most severe plus earthquakes that one can imagine, and it also has—if it is near the ocean, it has to be designed for a tsunami because earthquakes are also near oceans that can cause tsunamis.

So I think, again, what I said before is, let us first learn about this, are there going to be lessons learned, and I am sure there will be, and then we look back at our reactor fleet and we up our game. Every time we do this, we march on to ever increasing safety, and that is what we have been doing in the industrial world for hundreds of years.

Mr. FRELINGHUYSEN. Mr. Simpson, thank you. And, Mr. Dicks, the Ranking Member of the full Committee.

Mr. DICKS. Mr. Secretary, we appreciate your being here and testifying today. I wanted to ask you a couple of questions. First of all, we appreciate what the Department is doing at Hanford, the vitrification plant there is moving forward, and also the naval reactor work that you have some responsibility for. We are concerned, you know, and we want to make sure that Naval Reactors are funded properly so that we can move on to a follow on to the Trident submarine.

But one thing that has really bothered me, I have been in Congress for a considerable period of time, and I was here when we passed a law and said we are going to go to Yucca Mountain. Now, as I understand it, the Administration's position is that you have shut this program down, there is no money in your budget request. But there are lawsuits being brought, one in which the state of Washington is a plaintiff, and there is a lot of us who feel that in order to change this, Congress would have to pass a subsequent law, and that the Administration cannot just unilaterally shut this thing down.

What bothers me here is, we have these submarines and aircraft carriers coming into the shipyard in Bremerton, Washington, the fuel rods are sent over to Idaho. We made a commitment to the State of Idaho that we would have a way to take those out of Idaho and move the waste on down to Yucca Mountain. And you have got all of these utilities that have been spending all this money on the basis, or collecting the money on the basis that Yucca Mountain is going to go forward. Now, I understand the political ramifications, but from a legal perspective and a scientific perspective, I am troubled by the decision of the Administration. Can you tell us where we are and why we are doing what we are doing?

Secretary CHU. Well, where we are is the following; the decision about whether my General Counsel tells me that we do have the authority to do what we did, this has been challenged. The NRC Commission is going to be ruling on this.

Mr. DICKS. I understand they took a vote on this, and the vote has not been disclosed. Can you explain that?

Secretary CHU. No, I think the full Commission, I believe—as far as I know, the full Commission has not voted on that. There is a lower level Commission ruling on it because it was mixed. So when the full Commission takes a vote on this, my understanding is that this is in private. There is also a court case before this that could also have jurisdiction. And so whatever the Commission and the court decides, we will abide by. That is as simple as that.

And so as a result of that, what we have done is, we have preserved——

Mr. DICKS. On that point, has the Administration asked for legislation to be enacted to overturn the legislation that was passed first? Has the Administration ever requested Congress to change the law?

Secretary CHU. Well, the law——

Mr. DICKS. The Administration.

Secretary CHU. My understanding of the legal aspects of this, that we have within our purview a right to withdraw the application from Yucca Mountain, but, as you know, that has been challenged.

Mr. DICKS. Right.

Secretary CHU. And so, as I said, this will be determined both by the Commission and possibly by the Court of Appeals, and so we will see what will happen. But, our General Counsel tells me that we do have that right, but again, it has been challenged, and that is how——

Mr. DICKS. So if the court ruled against you——

Secretary CHU [continuing]. We would——

Mr. DICKS [continuing]. You would abide by the previous law?

Secretary CHU. Whatever the courts and whatever the Commission tells us to do, we will abide by.

Mr. DICKS. Okay, that is good to hear. Going back on this earthquake issue, you know, I am from Washington State, we have the potential for a 9 in Washington State. And I have worked with USGS on the monitoring equipment. We are not quite as good as California, but we are pretty well prepared. Now, are the reactors that we have in the United States, can they withstand a 9 on the Richter scale?

Secretary CHU. Well, I would have to say, as I said, when we build reactors or when we build waste treatment plants or any other facility that contains highly reactive, dangerous material, what we do is a specific determination at the site, what would be the maximum geological risk? And this is not a maximum geological risk, this is a maximum geological risk for a very long time, a sort of millennium scale time.

Mr. DICKS. Right.

Secretary CHU. And then we design above that, and that is the standard. We know this, as you know, well, and have the waste treatment plant that was——

Mr. DICKS. That was a big issue.

Secretary CHU. That was a big issue, and we said—we halted it because it was discovered that series—and we redesigned. Going forward in Los Alamos, the plutonium research facility, the materials research facility there, and deep in that design is the fact that you are near a fault. And so, again, we do those things. And it is—in the case of an event of a one several thousand year earthquake, we design so that there will be no significant release of the radiation to surrounding populations.

Mr. DICKS. All right. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you, Mr. Dicks. Mr. Rogers.

Mr. ROGERS. Thank you, Mr. Chairman, and welcome, Mr. Secretary. Sorry to be late to your hearing. But I do want to echo the sentiments of my colleagues and you with respect to the tragedy in Japan. Our thoughts and prayers are with the Japanese people, their leaders, the engineers working around the clock, and all the public health and safety workers.

With the economy still floundering, uncertainty in the Middle East, tragedies in Japan and the Gulf still fresh in our minds, the price at the pump is getting higher every day, electric bills on the rise, perhaps now more than ever, we ought to be focused on a strategy to move the country towards energy independence. I think we can all agree on that general principal.

In Kentucky, energy costs, home heating and gas, rival housing for the top line on the family budget. We have got an important responsibility to keep these costs as low as possible, because our families are struggling to make ends meet, and also for the businesses which are creating their jobs.

On the one hand, the President's lofty goal of producing 80 percent of our electricity from so-called clean sources is admirable. On the other, the resources we have readily at our disposal on American soil and immediately offshore are fossil-based.

Eighty-four percent of our energy today is sourced from oil, gas, and coal, 84. We have got 20 percent of the world's coal reserves at our disposal right now today, and there are some 16 billion barrels of oil ripe for harvest in a 2000-acre region of ANWR alone. And yet the Administration has undertaken a litany of actions that will have a negative impact or even completely stymie domestic energy production.

As the Secretary of Energy, you have the very difficult task of reconciling these two realities, shepherding a responsible transition to new, cleaner technologies, and striking an appropriate balance between our short-term needs and our long-term goals.

As you know, the 112th Congress has been solely focused so far on reigning in out-of-control spending and putting Americans back to work. You rightly quoted Mr. Augustine in saying that underfunding R&D in a time of austerity is like removing the engine of an aircraft to reduce its weight, but these investments must be targeted and reflective of reality.

I have always supported the all-of-the-above approach to American energy security that would maintain our stature of a leader in the development of cutting-edge renewable technologies while acknowledging that coal, oil, and nuclear will be a vital part of our portfolio for the foreseeable future. Do you disagree with that last statement?

Secretary CHU. No, I do not.

Mr. ROGERS. Can you speak more about it?

Secretary CHU. Sure. I think our fossil fuel will be needed in order to go forward. Let me first divide it between transportation sector and the electricity generating sector. I think we are largely dependent on oil for transportation. Let me also say that I think what the Administration feels that increased production of oil should be part of a long term strategy.

As the President has said, oil production in 2010 has been at its highest level in the United States since 2003. And so they have released new leases, and we are encouraging the oil companies that have—they are sitting on leases that are not being utilized to do that.

So we do think that increased oil production should be part of our strategy, in the short term. In the long term, we need to diversify from our supplies of transportation fuel. And to that end, we see improved efficiency, which Americans are now profiting by in the recent increase in gasoline prices. We see electrification. As I said, I am very bullish on the remarkable progress that has been made in the state of batteries only in the last few years, and we are now seeing where the cars, like the Chevy Volt as an example, Nissan Leaf, those batteries they are installing today are going to be marketed in two or three years. They will be putting in better batteries.

And we are investing in research which we hope, in five years' time, there is a reasonably good probability that we will be testing those batteries. And by that time, they should be three times less expensive, two or three times higher energy density. You can really now think of driving a couple hundred miles in a competitive car.

Mr. ROGERS. One of the most important programs in the development of cutting-edge clean energy technology has been the DOE Loan Guarantee Program. I understand that there are several advanced coal technology projects ready to move, but that DOE has been dragging its feet.

At the same time, you have been approving renewable and nuclear projects left and right. According to your Department's information, you have $3.2 billion in projects that may be finalized this year. Can you tell me why these fossil proposals were not processed at the same rate as the nuclear and the renewable energy projects?

Secretary CHU. Well, actually, to the best of my knowledge, during the Recovery Act, there was in other base funding programs, the so-called CCPI programs, a tremendous amount of investment made by the Federal government and I am glad to note, also matched more than 50 percent by private industry. There has been a retrenchment, at least in one project I know of—BP , not to go forward, but we are very hopeful that the other projects for carbon capture to develop these clean coal technologies will go forward. And so, we are pushing on those as hard as any of the other loan programs.

Mr. ROGERS. I really was not talking of——

Secretary CHU. Oh, it is not actually a grant, but——

Mr. ROGERS. Pardon me?

Secretary CHU. Sorry, they are grants. There are partial grants where we kick in a certain amount of money that is matched, more than 50 percent in many cases, by——

Mr. ROGERS. I really was not talking about carbon capture. I was talking about energy efficiency——

Secretary CHU. Oh, okay.

Mr. ROGERS [continuing]. And the ability to produce electricity. You have over $8 billion in authority available for fossil fuel plants. You apparently have enough projects identified to use the entirety of this funding and yet we do not see them. Can you explain why?

Secretary CHU. Well, in that loan program, it is like in the nuclear loan program, this is where, depending on the risk of the project and there has to be what is called a credit subsidy, and in the nuclear loan the credit subsidy is effectively like a mortgage insurance. The OMB has the ultimate determination of what that amount is, but essentially if you borrow X-amount of dollars, a certain percentage would have to be paid to the Treasury as a sort of insurance should one default on the loan, and there are not enough assets to recover the taxpayer investment. So, it is like an insurance policy.

In the fossil program as well as in the nuclear program, the companies have to come up with those subsidies, so there is no taxpayer money in the renewables. There is an addition that the taxpayer is actually paying. So, in those fossil fuel programs, it really depends—it is a financial decision on the part of those companies as to whether that credit subsidy is worth going forward with the loan. The advantage is that it does offer the companies lower interest loans, but they—depending on the risk of the project, they have to pay for those subsidies.

Mr. ROGERS. My understanding is that the companies have the money laying there and they are waiting on DOE to come back.

Secretary CHU. Well, I can get back to you on that.

Mr. ROGERS. I would think you would know right now.

Secretary CHU. Well, it is my understanding that we were processing those loans. Now you are telling me that—the loan projects are very, very complicated transactions and many, many times we have to—we have a duty to the taxpayer as we negotiate these loans that—to try to assess the probability that the loan might not be paid in time, what the assets of the company are that could—so the U.S. Government——

Mr. ROGERS. You also have the responsibility to spend the dollars that Congress appropriates and tells you to spend.

Secretary CHU. Right.

Mr. ROGERS. You have got billions of dollars laying unused and you have got companies who have put their money forward, very substantial, reliable companies that are not going to go broke, that have got money available and willing to do these projects now and they are waiting on DOE. Can you help me get to the bottom of this?

Secretary CHU. Yes, I can, but as I said, we also have to do it the other way because if we make a loan where we put the taxpayer money at risk, then there will be another set of people saying, what have you done? And so we have to be very careful. And in this, I spend a lot of time with our Loan Guarantee Program people to make sure we can, as expeditiously as possible, move these deals forward.

Mr. ROGERS. Well, you could be careful enough to where you completely block anything going on contrary to the Congress' will. Are we near that point here?

Secretary CHU. No. Actually, quite the contrary. You would be welcome to come visit the Department of Energy and the loan program and you see a group of very dedicated people.

Mr. ROGERS. No. I would prefer that you give me a report.

Secretary CHU. Okay. I will do that.

Mr. ROGERS. And quickly.

Mr. FRELINGHUYSEN. Thank you, Mr. Chairman. Mr. Alexander, thank you for your patience.

Mr. ALEXANDER. Thank you, Mr. Chairman.

Mr. Secretary, we are talking about gasoline so let us further talk about it, as you know, the Advanced Technology Vehicle Manufacturing Loan Program was created in 2007 to support the manufacturing of advanced vehicles to save on gasoline. One of the applicants awaiting a decision for over a year now is Next Autoworks Company. They plan to reequip a manufacturing plant in Monroe, Louisiana, and bring 1,400 direct jobs and about 1,800 indirect jobs into Northeast Louisiana as well as thousands of jobs to suppliers and contractors throughout the country. Every day that their application is delayed is another day that workers in Northeast Louisiana cannot be hired and another day that the unemployment rate in Louisiana is one of the highest in the nation.

Now, I have repeatedly inquired as to the timing and the status of the application and have been told to expect a decision soon. Likewise, the Department has communicated to the company on several occasions that the process was nearing an end, but today the application appears to be languishing in the same place it has been since last fall.

Given the critical economic impact that this project will have on our district, we have serious concerns about the Department's lack of focus and I think it is unacceptable that in more than 2 years only about 33 percent of the available loan money that was given to DOE by Congress has been used.

So, how many DOE personnel are devoted to that ATVM program today?

Secretary CHU. The exact number on the ATVM program, I do not know. I know that we have well over 100 people on the loan program, then if you include the number of outside people we ask, it goes much more than that.

Regarding the Next Auto loan, we have entered into due diligence and to the—we will get back to you—and to the extent we can, I mean, we are forbidden to talk about many of the details of specific loan programs to you. We can communicate to the company and, if they so choose, they can talk to you about it. And so we can certainly communicate directly to the company on what is happening with the due diligence.

Mr. ALEXANDER. Do you expect much of that remaining money to be utilized in this fiscal year?

Secretary CHU. Yes, we do. We have term sheets out now. First, I know there is a lot of unhappiness with the loans, but if you put it in the context, before this Administration took over the loan Guarantee Program not a single loan was issued, and there is something like 23 to 26, loans including ATVM loans, nuclear loans, renewable loans, you name it. So, we have made a lot of progress. We are working. We have term sheets out now to companies.

This is again, a point of—term sheets are the point of negotiation. This is what we think the Department of Energy can offer in terms of the terms of these complex deals. That would spend out the rest of the money, but we also recognize that many of those, as you go through those negotiations, not all of them will come to fruition and so we are actually developing more term sheets. So, we are going ahead aggressively.

Mr. ALEXANDER. So, you do not really know whether you expect anything within in the next 30 or 60 days? We do not know?

Secretary CHU. Well, again, we can get back to you to the extent we can on that specific loan, but we have been getting out loans and we have been steadily increasing the rates. And so we plan to continue doing that because we agree with you, we think that there is a dearth of long-term moderate interest loans and these loans actually do create a lot of jobs in America.

Mr. ALEXANDER. Could you let the Committee know in some small detail before we proceed with a budget?

Secretary CHU. Sure.

Mr. ALEXANDER. Thank you.

Secretary CHU. Thank you.

Mr. FRELINGHUYSEN. Mr. Womack, thank you, too, for your patience.

Mr. WOMACK. Thank you, Mr. Chairman, and thank you, Mr. Secretary, for your testimony this morning.

I want to go back to a question that the Ranking Member of the full Committee talked about a minute ago and that was on the nuclear design. And I think you made the comment that in design criteria you called it a millennial type criteria, that is, concerning the design of the reactors in this country. Have the recent events in Japan changed the paradigm on this millennial criteria design concept?

Secretary CHU. Well, no, in the sense that, I think—let us first contain the reactors. Let us stop any leaking and stabilize the situation and shut them down, and then after that we will go into the entire nuclear industry with the government of Japan and will be going into a very thorough investigation of exactly what were the causes of the failures, how did these multiple systems fail. And then from that we will proceed in trying to design or look at is there something we have overlooked in the United States, and proceed on that basis. And so, again, to use this experience to further improve the safety.

Mr. WOMACK. I realize the talking points that you have today about the recent tragedies in Japan are nothing more than a snapshot in time and that this process continues to evolve as we learn more, so I quite get that.

I want to change direction here for just a minute and talk about the Strategic Petroleum Reserves. We have heard a lot of talk about the potential for, because of rising oil prices on American family and business, but no real clear indication as to where we are in the calculus on the decision to sell oil from the SPR.

My limited knowledge of it, having just come to Congress, is that there are basically three criteria that we evaluate. One is an extreme shortage and immediate shortage. I do not think we are there right now, at least it does not appear so, but the dramatic increase in price or the potential for some kind of an economic calamity associated with rising energy prices, can you tell me where we are in this calculus?

Secretary CHU. Well, as the President has said, any drawdown or change in the Strategic Petroleum Reserve is one of several tools that are available to us to deal with the criteria, for example, of significant disruption in supplies. Its original intent was to allow the machinery of the United States to continue in case there is a significant disruption as we saw in the mid-'70s when the OPEC countries disrupted their own supply. This is a different situation.

We do, all over the world, have excess capacity and we are looking at that extra capacity and how it is brought to the market, but we are also leaving on the table the possibility of drawing down the Strategic Petroleum Reserve, the IEA also has member countries that are importing oil which have strategic petroleum reserves and we are in discussions with them.

And so it is not a single thing. It is ultimately going to be a judgment call as to what is happening. We are very concerned about the prices and the price rise. It is causing great hardship to American families, to businesses.

You know, our economic recovery is fragile and we are also concerned about that. The prices have stabilized. It is very important they stabilize, both crude and the price of oil. But having said all this, this is something that we are very, very sensitive to on the short run. But over the long-term, we also need to plot a coherent strategy and be determined to push forward, which is includes efficiency, electrification, advanced biofuels, and now natural gas can be part of our transportation solution. Again, that we diversify. When we are dependent on a single fuel source, oil, for our transportation needs, then we are subject to this. And so, unless we diversify, unless the world diversifies in this way, we will continue to be subjected to this.

Mr. WOMACK. Assuming that we do not have a shortage issue, which would be one triggering mechanism to the sale of oil, and assuming it has to do with price, is there a trigger that is in that calculus right now that you can tell us? That gas at X or diesel at X would trigger this spike in price and result in potential economic uncertainty?

Secretary CHU. No, there is no single threshold or trigger point, for example, based on prices. As I said, it is a complex set of variables, but also remember that the reason those reserves are there is in case we do get an interruption in supply where we in the United States and the essential services in the United States could not go forward, that is the fundamental reason. But it is certainly a tool in order to look at what we can do.

The Strategic Petroleum Reserve was used in exchange during Hurricane Katrina to swap crude oil for refined goods because our refineries were knocked out of service. There have been instances where we have used that, but they are instances. Again, it is a tool and we are monitoring the situation. We are very sensitive to the stresses and strains on the American people, on the American economy.

Mr. WOMACK. Mr. Secretary, in your opening statement you mentioned the elimination of subsidies for fossil fuels. What criteria would you use in the future to determine the right time to eliminate subsidies for renewable production?

Secretary CHU. Well——

Mr. WOMACK. And let me add one more postscript to that question. Could it be—one of those criteria, could it be when the product is exported?

Secretary CHU. I would say that our goal is—first, the fossil fuel subsidies have been continued for a long time. I believe the first oil subsidies started about 1917, and so it has been with us for most of the 20th century. Because those industries are very mature, we feel that they can stand on their own.

In terms of subsidies for solar, wind, that is a very fair question because you cannot design something that will continue, perhaps, subsidies for a century or even half a century, quite frankly. And so, in our design of what we do in the Department of Energy, we are actually targeting these renewables to be competitive with fossil fuel without subsidy. You may have heard of this new initiative Sunshot, which combines what we do in Energy with Office of Science and RBE. Industry believes that the full cost, including installation, including the land use, everything of utility scale photovoltaics will drop by 50 percent within this century, but that is not good enough.

It still would be more expensive than fossil fuel, and so we started engaging in a series of workshops. Can you drop it by 75 percent? At that point, it is competitive with fossil fuel today without subsidy, and in these discussions with industry we began to say there is a reasonable chance we can accelerate the process so before the end of the century we get there.

Now, that is very appealing to us because that means without subsidy, you can have something, and whether it is in a 10-year or 15-year time period, we are not advocating that we heavily subsidize for 25 years. We do not want that. The most appealing part of it is that the country and the companies that develop these photovoltaics can sell worldwide, and we would rather it be the United States. And, again, we are in a very deep race with China, with Japan, with other countries around the world to develop these technologies and that is why we are asking for what we are asking in the budget. This is American prosperity in the coming years, and that is what is at stake, we believe.

Mr. WOMACK. What about ethanol?

Secretary CHU. Ethanol is good. It is a good transition fuel. It is now powering—it is blended in 10 percent of the cars. This is a good thing. But, again, we are—in the Department of Energy, we are focused on bringing fuels that not only could be—ideally you want to use as feedstock, not sugars or starches, but more complex, woody materials that are grasses, that do not need fertilizer or irrigation, agricultural waste like wheat straw, rice straw, corn cobs, timber wastes. We think that half of the biofuels can come from that material. So, if we can convert that, again, in a subsidy free way into diesel fuel, jet fuel, gasoline fuel, then all of a sudden can, again, decrease significantly the amount of oil we are importing.

Now, how real is that? Well, as I said, one of the power plants now that has been established—there are two power plants that I know of are converting simple sugars into drop-in diesel substitutes, but already in the labs and in papers being written, this is now a direct conversion of lignocelluloses material, this woody material, into drop-in fuels. We do not know whether that is going to be commercially viable. You start by—we did the science, it is possible. You then work on the productivity and we will know in a couple years, and if it works, industry sector will pick this up and invest in it. And so that is very exciting because then that means a lot of the waste residual products that we already have that we now have to bury, can be turned into fuels. And that is very exciting to me because instead of exporting 300- or $400 billion a year to buy oil, we could be actually using that money to generate the wealth in the United States, and so that 300- or $400 billion goes to Americans.

So, again—and this is the same with the batteries, electrification, we generate the electricity in the United States, and so this is what we are trying to do in turning this around, and this is what we have to do, quite frankly.

Mr. WOMACK. Thank you, Mr. Secretary. I yield back.

Mr. FRELINGHUYSEN. Thank you, Mr. Womack. Mr. Nunnelee.

Mr. NUNNELEE. Oh, thank you, Mr. Chairman. I think what I would like to do is continue the line of questioning from my colleague, Mr. Womack, regarding the Strategic Petroleum Reserves.

In general, if you could summarize, what is the Administration's position at this point on the release of oil from the Strategic Reserve?

Secretary CHU. It is that it is on the table, it is a possibility, it is a tool that could be used, and we are looking at that very, very closely. But there are other tools and the most important tool is to get—and this has been increasing—to get the spare existing excess capacity up and going and get the oil to the marketplace, and that is happening. That is in the very short-term. And in the mid-term, we should resume the exploration in those areas that have been opened up for exploration, the places that have been leased. And in the slightly longer term, it is those things I talked about, like electrification, biofuels, and efficiency. Efficiency also is in the short-term.

Mr. NUNNELEE. All right. Following up on exploring additional existing sources, and I know it does not come under your jurisdiction, or at least I do not think it does——

Secretary CHU. No, it does not.

Mr. NUNNELEE [continuing]. But we have a lot of oil in the Gulf. We have a moratorium that a federal judge has said was lifted, and so far we have had one well approved. Is that not a viable alternative to——

Secretary CHU. Yes.

Mr. NUNNELEE [continuing]. Releasing from the Petroleum Reserves? And what can we do to move that forward?

Secretary CHU. Okay. So, so far there have been two deep sea permits granted since Macondo. During that time, I believe its exact numbers maybe 33, 34, shallow permits have been granted in the Gulf. There was no moratorium on the shallow permits, but the deepwater permits have been lifted and we are now going through and granting more permits, and so—and this will continue. And so I think that has to be part of the strategy.

Mr. NUNNELEE. What have we learned from history about releasing oil from the Reserve in terms of the long-term impact on price at the pump? And what are the key decision points that the Administration will be looking at in making that decision?

Secretary CHU. The long-term impact, quite frankly, there has not been, because in the long-term, the price of oil has been determined by much deeper supply-and-demand issues, and so there might have been some short-term things and certainly it is a tool for calming down future jitters. But I think in the long-term, if you look at what we are facing long-term, what we see is that the developing countries, particularly China, but then followed by India and other developing countries, will have a distinct increase in the amount of transportation fuel that they will use. America, OECD countries, will be essentially flat. America might actually decline because of the biofuels and efficiency, and actually in all OECD countries.

The supply of oil is the other big thing, and the reserves we are now tapping from around the world are declining, and so you have to go to new finds, which we are doing, but the long-term prospect of that is that you also are transitioning to more inaccessible areas, deeper offshore—Brazil has a significant find, but it happens to be two miles deep. There are Arctic locations, and then unconventional sources of oil, tar sands oil, things of that nature.

So, in the long-term, the 10- and 20-year prospect, when you look at those predictions and you look at the rise in demand is that we have to diversify our supply of transportation fuel in order to be economically viable and to go forward with a strong economy and have affordable transportation energy. That is the long-term.

Mr. NUNNELEE. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. Thank you. Mr. Secretary, you mentioned in response to Mr. Dicks the Nuclear Regulatory Commission's upcoming decision on Yucca Mountain. Many people feel the Chairman is stalling and there's this I think, feeling that in the House we might put forward a bill to require the NRC to make a decision by a certain date. Would you be supportive of such a move?

Secretary CHU. Well, I do not think I should comment on that. I think—or, I do not have a window into Chairman Jaczko's mind and so——

Mr. FRELINGHUYSEN. We think we do at this point in time.

And of course, Mr. Dicks made reference to the opening arguments next week, March 22nd, by Representatives of Washington State and South Carolina, that are suing the agency relative to Yucca. If the court rules against the Department, would you provide a little more clarity as to what you might do?

Secretary CHU. Well, it depends——

Mr. FRELINGHUYSEN. Would you appeal? And what kind of money would we need to get things moving again if you were to abide by that decision?

Secretary CHU. I cannot speculate on that, but certainly if——

Mr. FRELINGHUYSEN. We would welcome your speculation if you want to confirm anything.

Secretary CHU. Well, but I would say that, we have not even discussed whether we would appeal or not——

Mr. FRELINGHUYSEN. I cannot believe it.

Secretary CHU. No, well, I have not. The issue is one we will take it one step at a time. As I have said, we preserve the records. Some of the key people have been transferred over to Nuclear Energy Division so we can start this up, and so if we are required to start it up, we will start it up.

Mr. FRELINGHUYSEN. It worries us, a huge investment here, and we have covered this territory before, but——

Secretary CHU. Right.

Mr. FRELINGHUYSEN [CONTINUING]. I think you sort of get the feeling, many of us are keen on making sure that we keep this, that we do not lose out on this——

Mr. DICKS. Mr. Chairman.

Mr. FRELINGHUYSEN. Yes, sir. Happy to yield to the Ranking Member.

Mr. DICKS. What about the Commission, the President's Commission? When are they going to make—the Blue Ribbon Commission, I am corrected by Mr. Pastor—when are they going to make their recommendation? And do you have any ideas of what they are going to recommend?

Secretary CHU. I do not have any ideas what they are going to recommend. I believe the draft of their recommendation should be out by June. I do not know if—yes, it is June, and——

Mr. DICKS. 2011?

Secretary CHU. June of this year, yes.

Mr. DICKS. Just checking.

Secretary CHU. Yes. Yes. And, again, this is the reason for this Commission. We are in a different place than we were in 1982 when the Nuclear Waste Act was passed, and 1985, when it was modified. We are in a different place in many respects. A week ago I would have said that we were going to be restarting nuclear—I still think we're going to be restarting the nuclear industry, but I think that is in a different place than we were in the late '80s. We are in a different place in terms of technologies. We are beginning to look at and how to deal with spent fuel. And we are in a different place in the technologies and have a more fully utilized fuel that we do have.

And so all these things, the Commission will have to consider and take advantage of, and to consider and to recommend an improved strategy going forward. We have to deal with the back end of the fuel cycle, and that is their task.

Mr. DICKS. I——

Mr. FRELINGHUYSEN. Reclaiming my time, I understand the NRC staff is saying that they cannot release the information. Is that right?

Secretary CHU. That, I do not know about.

Mr. FRELINGHUYSEN. Volume 3?

Secretary CHU. Of?

Mr. FRELINGHUYSEN. Of the SAR.

Secretary CHU. I would have to get back to you.

Mr. FRELINGHUYSEN. Would you get back to us? You know, if things are buried there and we cannot get access, that is disturbing to us. So, if you can get back to us.

Secretary CHU. Again, this is an NRC issue and I can——

Mr. FRELINGHUYSEN. It is an NRC issue, but——

Secretary CHU. Yes.

Mr. FRELINGHUYSEN [continuing]. The Administration's view and our view certainly are important, very important.

Secretary CHU. Right.

Mr. FRELINGHUYSEN. I just want to get a question—we read in the newspapers about other countries taking a look at the Arctic and I am wondering where we are in the overall equation.

Secretary CHU. That is true——

Mr. FRELINGHUYSEN. In terms of resources here, I mean, the people are sort of in their own mind, and perhaps claiming territory dividing up the Arctic. Where are we in the equation? Is this——

Secretary CHU. We are——

Mr. FRELINGHUYSEN [continuing]. Administration doing what it should be doing?

Secretary CHU. We are looking at Arctic regions and for potential exploration and mapping and potential leasing, and so that is still continuing. You know, I think that——

Mr. FRELINGHUYSEN. It is continuing, but, you know, we read that the Russians have a pretty big footprint up there and they claim certain territory. There is sort of a gut feeling that we have not been securing our claims. There are incredible resources there and could you categorize what—I am sure you know of those.

Secretary CHU. Well, there are certainly considerable resources. This is in the bailiwick of the Interior, but my understanding is that looking at the Arctic, both onshore Arctic in American territory and offshore, is being looked at, and so, again, it is something that is in the jurisdiction of the Department of Energy, but we would be glad to get you——

Mr. FRELINGHUYSEN. Well, if we look at resources in the Gulf, and to some extent there were reasons given for shutting down production there and now we are starting it up, certainly some people are looking north to the Arctic as a potential major resource which would provide us a certain amount of oil and other valuable assets.

Secretary CHU. Okay, so just a minor correction, we shut down deepwater exploration for a short period of time. The production actually continued and now the exploration has started again.

Mr. FRELINGHUYSEN. Yes, but in the meantime, with all due respect, a lot of people were laid off, a lot of people moved equipment to other locations around the world. It was a perfect storm for the people in that neck of the woods, a veritable nightmare, and it will be difficult to recover from it.

Just a question on ethanol. I am disturbed—and this following up on Mr. Womack's question—you do not endorse—there is ethanol and there is ethanol, and those who grow corn may not like my inquiring about this, but I understand that 40 percent of our national corn crop is used for ethanol purposes. Where does the Administration stand relative to that use?

Secretary CHU. I think the standing is that this was a start of a blend to decrease our dependency on foreign oil. We recognize that we need to develop better avenues to create wealth in rural America, which is very important, but in the Department of Energy we are focused on what we believe ultimately will be a long-term better solution than what we currently have. So that is what we are working on, that is what we are focusing on.

Mr. FRELINGHUYSEN. That is a great answer. Let me ask it again here. If we are using 40 percent of our corn supply for ethanol, are we subsidizing that type of ethanol through any of our DOE programs?

Secretary CHU. DOE? Not that I know of.

Mr. FRELINGHUYSEN. No?

Secretary CHU. No.

Mr. FRELINGHUYSEN. So, I just wonder whether you have a position on the use of that viable resource.

Secretary CHU. We do not. In the Department of Energy——

Mr. FRELINGHUYSEN. You do not pick winners and losers?

Secretary CHU. Pardon?

Mr. FRELINGHUYSEN. You do not pick winners and losers?

Secretary CHU. We are not investing our resources in corn ethanol. We are investing our resources in other solutions which we think would be better long-term solutions for creating wealth.

Mr. FRELINGHUYSEN. Well, I hope you share some of my concern. I mean, whether you may be reluctant to do it publicly, but I am concerned.

Let me just ask one last question before I go to Mr. Pastor. There have been some press reports last week that you have formed an internal task force to develop plans to lay off significant portions of your workforce. Is there any substance to that rumor?

Secretary CHU. Well, let me speak broadly to that. I think in terms of—we have to make plans——

Mr. FRELINGHUYSEN. We admire your commitment to reducing expenses and better managing your Department, so is there any substance to it?

Secretary CHU. There is one instance where what we are going to be doing is looking at the way we conduct our business in the Department of Energy, and what we have found in certain areas is that there seems to be a duplication of how you prepare what you want to fund and what is actually written for these so-called FOAs and things of that nature. And so we are very carefully looking at that to see if we can streamline those processes.

But I should also say that we are realistic about what we are going to be expecting in the 2011 Continuing Resolution and because of that, the laboratory directors are also having to develop plans for what will happen. The Senate has weighed in, the House has weighed in, and so we need to begin to develop plans.

Those plans do call—and, again, it really depends on our final budget—but they will necessarily call for involuntary layoffs at our national laboratories.

Mr. FRELINGHUYSEN. So this is obviously a potential impact for the laboratories and your workforce here.

Secretary CHU. Our workforce here.

Mr. FRELINGHUYSEN. Is there any focus——

Secretary CHU. Yes, we are——

Mr. FRELINGHUYSEN. Specifically here as opposed to minimizing it out of the many great laboratories we do have.

Secretary CHU. Yes, absolutely. I think——

Mr. FRELINGHUYSEN. With all due respect to you, they are the critical mass certainly, and we favor and recognize on this Committee your defense portion and responsibilities.

Secretary CHU. Well, I would say not only defense, but the science, the renewable energy, Idaho, all those things.

Mr. FRELINGHUYSEN. You mentioned Idaho. So noted.

Secretary CHU. Or I can go down and list all the national——

Mr. FRELINGHUYSEN. You could, you could. Do you want to put Princeton in there, too?

Secretary CHU. Yes, Princeton, excellent science laboratory. But seriously, I share your belief that, in the end, what happens to the federal funds ultimately is that it goes to people in the national labs. It goes to universities. It goes to company research. And that's the heart and soul of what we do in the Department of Energy. And so whatever happens to our budget, we have to remain focused. Those are the things that are really going to drive innovation. Those are the things that are really going to create jobs in the future. So we need to, as a minimum, maintain that ratio, but actually I'm looking forward to actually improving what the military calls the tooth-to-tail ratio. And we can do this with a lot of—we certainly want to protect the federal worker jobs, but there are a lot of people who are consultants. Their short-term work is a substantial part of our workforce. And we're looking very hard; do we really need all those people? And so we do want to improve the efficiency and the speed in which we make decisions, as well as improving the quality of those decisions. And we are very focused on this.

Mr. FRELINGHUYSEN. So you're looking towards the military model in certain respects.

Secretary CHU. Well, I think—I would not say it that way, but I would say having been——

Mr. FRELINGHUYSEN. You can say it anyway you want. I saw that in your remarks.

Secretary CHU. No, I would say more——

Mr. FRELINGHUYSEN. Some of us serve on the Defense Appropriations Committee, and I'm not sure in all instances that is——

Secretary CHU. No, the model we're actually trying to emulate is a well-run company.

Mr. FRELINGHUYSEN. Oh, good. Mr. Pastor.

Mr. PASTOR. We've talked about trying to achieve independence from oil and our fossil fuels, and we're also concerned about climate change. As you mentioned, in transportation there's a high concentration of oil and natural gas. Maybe as we improve the batteries and get the cost of electric cars down natural gas may be a transition. It seems that many of our plants that produce electricity today are over 30 years old. In many cases they're very inefficient and some that are operating partially, and that's going to be a whole infrastructure we're going to have to change. And at least as a transition as we go to other types of fuel, natural gas seems to be the one that right now is something that we're looking at in terms of—that's the possible transition for these electric-producing plants. It also seems to me that right now shale is also becoming very popular in terms of using shale to produce the natural gas. And if you look where shale deposits are available, it's in the Midwest and Pennsylvania and areas in the United States where you also have the aging infrastructure of the coal plants. So there seems to be a relationship if we're going to do the transition that shale seems to be at least a partial answer in terms of being able to produce the natural gas that will transition these electric plants. But hydro-fracking is a concern right now. What do you see being the environmental issues and the other issues to deal with fracking to produce natural gas from shale?

Secretary CHU. Well, the environmental issues are twofold: One, as you drill down into the shale formations, you actually go through water tables. And you'll be injecting fluids through those water tables, and you need to isolate very well those drills. The oil and gas industry has technologies that can do this; multiple-line casings that can isolate so that as you drill and as you force fluids into the shale that it does not leak into the water table. Then what you do is you use fluids to crack the rock and then you take those back up. The other environmental one, which is potentially more significant, is that these fluids have to be collected. They can not be dumped out into the environment. They have to be treated and made sure that whatever is in those fluids, both the fluids used for fracking and whatever you bring up to the surface, is done in a way that satisfies the regulations that we have for clean water. And that's the risk and so one has to make sure that that, too, is taken care of.

Mr. PASTOR. Do you see that the mining of shale for natural gas is going to be a long-term investment that we're going to undertake in this country, or is it one of those short term—and also in relationship to what's happened to our electric-producing plants?

Secretary CHU. Right. Well, what's been happening in the last 5 and 10 years is an appreciation that this type of gas can be extracted economically and so there has been a vast amount that's been invested in this. I believe it's about 30 percent now of the natural gas production in the United States and that will probably climb. Again, we have to be very sensitive to these environmental issues and make sure that we do it safely and it does not expose our people to the risks that we talked about. Assuming that that is true, that we can do this and develop it safely, we think that these additional gas reserves will probably keep the price of gas down for the next decade, possibly longer. Again, it depends on how the technology develops after that. And so, as you yourself have noted, the access to the shale gas has kept the price of gas down and many utility companies, many gas companies, feel that that price will be kept low at least for a decade and possibly longer. And it provides—in a combined cycle gas unit to generate electricity, it has far less of the conventional pollutants than in a coal plant; and so one naturally sees, just from the pure economics of this, a sort of natural transition to natural gas. But in the meantime, I think it's important that the United States government still do research on clean-coal technologies because we do have a lot of coal, and we do not know what's going to happen 50 years from today. And again, we do not want to be overly dependent on a single source of electricity generation. So you have to have this broad approach to our energy solutions.

Mr. PASTOR. Okay, well, let me ask the question this way. There's a great reduction in fossil fuel research, so how do you combine the need for research on coal, because we have massive amounts and we're going to continue, and yet you're reducing the research on it? How do you explain that one?

Secretary CHU. Right. Well, because the work we're doing on coal is work to capture and sequester the coal, and so we view that as a bit different than the work in order to help a long-established industry be more efficient or to subsidize them in the extraction process itself. And there's certainly going to be work in the U.S. government to help look at the safety issues. The Interior Department is going to be getting funding to help in the safety issues of deep water. I mean, there's going to be some funds somewhere in the government for the safety issues of frack recovery and natural gas. The coal is we feel different because the technology to capture and safely sequester the carbon dioxide is something which would—I think companies left to their own devices may not—these are high-cost, high-development, things and it's different. So we're not subsidizing coal mining companies to go get more coal. We're doing something to help them decrease the pollution, and we think this is an appropriate role of the government.

Mr. PASTOR. Do you think it would be an appropriate role of government to invest in the development of a better technology for the fracking process?

Secretary CHU. Well, actually, the Department of Energy did support horizontal drilling and fracking I think from 1981 or '82 till '92 or '91 or it could have been in the late '70s. And so it was actually Department of Energy funds that lead to this. At that time, early on in those early years, the oil and gas companies did not think that it would be commercially viable. Now we got out of it when Schlumberger got in it. In '92 Schlumberger started to look at fracking—or '91 Schlumberger got in it. And in 1992 we felt that the private sector is picking it up and so I think that was appropriate to be leaving.

Mr. PASTOR. So is the private industry doing enough to improve the technology so that this form of getting natural gas will continue to increase and help us in our transition from coal?

Secretary CHU. Yes, right now they are certainly doing that because they now recognize that it is a source that can be developed economically even with these low gas prices. And so, again, you see a lot of investment now. Major oil companies are now buying shares in the companies that have the fracking leases, and so we see a lot of big company money now going into this area. Again, the private sector does think there's a significant reserves increase in the United States.

Mr. FRELINGHUYSEN. Thank you, Mr. Pastor. Mr. Lewis.

Mr. LEWIS. Thank you, Mr. Chairman. Secretary Chu, I must say that as I've watched you this morning, I admire your patience in our taking you around these small circles repeatedly. But in the meantime I'm going to ask you to return one more time to Yucca Mountain. You took us a while ago to 1982, 1985, as we were considering what we'd do with the spent fuel and the application of nuclear energy and development. The San Bernardino County desert in California is large enough to put four eastern states in. There are similar vast, open spaces in Nevada. We call them the boondocks, a long ways away from the urban center. Yucca Mountain did not get its development where it's located by accident. It's in the boondocks. In the meantime, some years after that development, some controversy by a relatively small group in Nevada suddenly made this a huge issue. Let's assume, setting court cases aside and otherwise, we find ourselves in a circumstance where the pressure continues to build to essentially close down Yucca Mountain, keep federal dollars out, et cetera. Presuming that that occurs, then what? What are we going to do to replace Yucca Mountain? And how quickly can we move in that direction? What are the challenges?

Secretary CHU. Thank you for that question because it's——

Mr. LEWIS. You're welcome.

Secretary CHU. No, I really mean it sincerely. I think the history of Yucca Mountain is one where I think it's told us a lesson. And we watch what other countries are doing with their citizens. And we also have some experiences in other sites which are repository, geological repositories, for low-level waste. So the moral of all those experiences is that you have to start a dialogue. There are a number of potential sites and the moral is you start a dialogue with the state, with the local communities. And it's not you just do not take this and there's this one place we can force it. The United States is blessed with a lot of places which are low population densities, and also there are potential geological sites—and this is, again, for the Blue Ribbon Commission—and so when we watch what Sweden is trying to do and how they're approaching it, and we watch what happened in New Mexico in WIPP, for example, in Carlsbad. There are very different experiences. There's some uneasiness, but it's a question of can you do this safely. And if you can and it does not expose the local citizens, then it becomes income generating. And so that is the experience we are having in New Mexico. And if it turns out that all the court cases go forward—they could rule against us, they could rule in favor, that I think in picking future sites—and plural, sites—that you're going to have to start a dialogue with the states, with the communities. And do this in a way that 29 do not gang up on one and say here's where it's going because as you know things can end up in courts for decades. And there could be something in it for the state and the local community. And ultimately, we also have to do all these things very safely. There were some concerns about transportation. That did not turn out to pass and it was done very safely and we have a decade of experience in this. So knock on wood, but this is I think going forward what we will need to do. And that's what other countries are doing. They are developing a dialogue because they, too, have to deal with these issues.

Mr. LEWIS. And I guess that as one goes forward with that dialogue in any number of places in the country, we should be reminded continually that income generation is a very attractive piece of all this. Income generation was the "why" of Yucca Mountain being acceptable in the first place in the mind's eye of many people. But over a relatively short period of time, suddenly another dialogue, another discussion, took place that involved essentially closing it down. I've been fascinated over this almost 30-year period to see first income generation be the driver, Yucca Mountain developing, leaders in Nevada as well as in California anxious to see this development, and then the controversy raises its ugly head over time. And kind of two-thirds of the way down that 30-year period, suddenly there's a movement to close her down. So you start the dialogue. You have income generation. Then you find yourself in this box. I experienced a transportation box as well for much of the transportation goes across my desk, too. In the meantime, the folks out there want to have income generation. They want to have energy available to them at the lowest possible price. But please do not put anything that might disturb my backyard near my backyard.

Secretary CHU. In many instances that is certainly true. It is true of many things whether it's wind farms, solar farms, a factory. You name it, transmission lines. So again, it's one of those issues that one has to really work through.

Mr. LEWIS. Thank you for spending as much time as you have on this today and for your patience as well. Thank you, Mr. Chairman.

Mr. FRELINGHUYSEN. There are some of us who feel the administration overstepped its authority in closing down Yucca, but we'll see what the courts have to say about that. Mr. Fattah.

Mr. FATTAH. Thank you, Mr. Chairman. I guess it's akin to everyone wanting to go to Heaven, but none of us wanting to die. But in this situation here where—I am referring to the Chairman's point that when the President appointed you he said that the economics of our country and our national security were inextricably intertwined with the work of the Department. And then we have this discussion about HR1. When Congress passed this—and I think it was well intentioned by the Majority to try to get our fiscal house in order—but we ended up cutting some of the early warning systems available to warn us of a tsunami. The cuts to NOAA, the cuts to some of our efforts in terms of innovation and energy, can have the same kind of effect—I think what Roll Call in its editorial a few weeks ago called it, that we were cutting America's "seed corn" when we interject these cuts on this new wave of innovation. So I just want to separate the fact that, at least for myself, I do not think that we should be making cuts in the areas that are critical to the future economy of our country. I think it's not the right decision. Our taxes are at their lowest they've been since 1950, and I think we should be investing in new forms of energy. And I want to spend a little more time on this because my colleague at the far end was asking about the Strategic Petroleum Reserve. I want to see if you could help us understand how the world's oil supply actually works. You said that the reserves in the world are shrinking and, therefore, we have to look for new fields. Is that correct?

Secretary CHU. The reserves that we are currently drawing from do diminish and so when you look at all the EIA, IEA, WEO, these reports, what you find and the oil companies also know full well—you've got an oil well, it begins to deplete.

Mr. FATTAH. There's less of it, right?

Secretary CHU. Right.

Mr. FATTAH. And you did your undergraduate work in math so we got that part of it. So there's less of it, right? So there will be a time even with the new finds that they'll also shrink, right?

Secretary CHU. Well, that's right, so you——

Mr. FATTAH. So now—just follow me for a minute.

Secretary CHU. Okay.

Mr. FATTAH. Say we have some oil here that is in our domestic supply, right? And we're the world's wealthiest country and our general policy is we want oil that is found to go out on the world market. Right? That's our policy now?

Secretary CHU. No, we're importing roughly 50 percent of our oil.

Mr. FATTAH. No, no, oil that's found anywhere in the world, we want it to go onto the world market.

Secretary CHU. Well, that's actually what happens, yes.

Mr. FATTAH. Right, that's our policy as a country. That's what we want. Right? And we want it to go on the world market so that we can buy it, right?

Secretary CHU. Well, we——

Mr. FATTAH. And other countries can buy it?

Secretary CHU. That's correct. The oil is a world commodity that is sold on the world market.

Mr. FATTAH. Now if at some point we have a situation where there's less oil available because it's diminished, would it be good for our country to have a domestic supply still untapped? Would that be a good thing?

Secretary CHU. So let me respond by saying the following: Right now we're consuming 25 percent of the oil in the world. We have 2 percent of the known reserves. There will be future reserves in the United States that we know also because reserves are a bankable asset and so in unexplored areas we will know we will get more reserves.

Mr. FATTAH. Well, I'm trying to figure out whether it will be smart for us to take all the oil that we have now and use it.

Secretary CHU. Well, first—I get your point—your point would be, if I could paraphrase and tell me if I'm wrong—why are we so focused on using up all of our oil? Why don't we use up other people's oil first? Is that what you're saying?

Mr. FATTAH. Well, I'm saying that it's the American policy on oil, right? That's always been our policy that we want oil to be a world commodity traded on the world market, right? And that right now we are a wealthy country. I'm talking about compared to others. We are buying oil off the world market.

Secretary CHU. But this is more complicated because——

Mr. FATTAH. Well, that's why I want you to help the Committee understand this.

Secretary CHU. Right. Yes, oil is a world market commodity and that governs the prices even for domestically produced oil. Now having said that, we're also sensitive to the fact that the more oil we import, the more this is wealth in the United States leaving our country and going offshore. And so that's another factor we have to consider.

Mr. FATTAH. So we have a trade deficit because we're making these other countries wealthier when we're buying their oil. But there will come a point when their reserves diminish.

Secretary CHU. There will come a time when all the reserves diminish, and you're going to have to go find other new reserves. And that is what's being projected, that we will be finding new reserves, but the reserves—the question is were those finding of new reserves and transiting to more expensive oil recovery because that's why we're going deeper offshore.

Mr. FATTAH. I'm just going to the President's comments about our future in terms of national security and our economy. I'm trying to understand whether a 100 years from now or 50 years from now, we're in a better place if we have no reserves in the United States, because we've reduced them to zero. That's what I'm trying to figure out, and I understand the economic crosswinds of us purchasing from other countries now. I'm just trying to think it through all the way to a logical, rational, conclusion about where it would be when our grandchildren and great grandchildren have the responsibility of stewardship of a great nation.

Secretary CHU. Right. I would say what we have to move towards is diversity. Oil is used for transportation primarily. A little bit for plastics, but primarily for transportation. A little bit for eating, but that's a technical detail. We need to diversify our sources of energy for transportation so 50 or 100 years from now, as we see inevitably, the price just from pure supply and demand going up, we have to diversify our transportation energy to the things that I talked about. And that's why it's so important in the long term. We have to move towards that.

Mr. FATTAH. Right. We're doing that. Electric and we can eventually use liquid gas and biofuels. I'm just trying to understand it, but you have not answered my question about whether the country would be in a much stronger position if we reduced our domestic reserves or if these other known reserves in the world were diminished. Which one positions our country better?

Secretary CHU. Well, it's not really an either/or because we are expecting to develop new reserves in the next 50 years quite frankly. There will be new exploration, and we will be finding oil on American territory. We expect that. We expect that people around the world will similarly find oil in their territory for 50 years. Now 100 years is a long time.

Mr. FRELINGHUYSEN. I'm going to weigh in here for a minute if you can conclude your remarks, Mr. Fattah, so I can recognize Mr. Simpson.

Mr. FATTAH. And so, very quickly, we do expect to find future reserves. Certainly we would like to have reserves in the United States for emergencies and for our own domestic supply. So I think I agree with you on that. We definitely 50 years from now want our own domestic reserves.

Mr. FRELINGHUYSEN. Thank you. Mr. Simpson.

Mr. SIMPSON. We'd be better off if we had all the oil and nobody else did.

Secretary CHU. What did he say? What was the question?

Mr. SIMPSON. A couple of quick questions. One, I thought I was going to get through the hearing without mentioning Yucca Mountain. I was really trying hard. As I understand it, the year before last we requested $192 million in the budget in order to proceed with the licensing of Yucca Mountain. Then last year, you requested no funding for Yucca Mountain. In fact, the year before last I offered an amendment, a motion to recommit, that would have struck the $192 million out and said if we're not going to proceed with it, let's just wipe the $192 million out. I think it got like

35 votes on the floor or something like that, which tells you where Congress is coming from in general. Having said that, last year you requested no funds for Yucca Mountain, which is, I guess, for whatever this budget is we're in now. My concern is that even if Congress goes in and says "We're going to override what the administration wants to do; we want to proceed with Yucca Mountain," that you've dismantled essentially the personnel at Yucca Mountain. So what would it take to restart that if Congress decided to do that? How difficult would it be to get those technical people back on the job? Would it be impossible to do or is it possible. But would it be very difficult to do because they've moved on to other jobs where there's probably a future?

Secretary CHU. They have moved on to other jobs. As I said that some of the key people have been reassigned into the nuclear energy area in the Department of Energy. There's others who have moved on to other jobs. It would—I can not give you an exact time of how long, how many months, three-quarters of a year or two. We preserved the records of what was going on so they're fine, and it would take some time but we certainly can start up. But that's sort of the time scale. I do not see it taking three years or two years to start it up in full.

Mr. SIMPSON. I see the future of Yucca Mountain being a place where we can store all those records and studies done on Yucca Mountain.

Secretary CHU. No comment.

Mr. SIMPSON. It's dry. It's nice.

Secretary CHU. It's not so dry actually.

Mr. SIMPSON. It's fairly dry. It's Nevada. I am hearing from personnel at the labs, the labs we visit and others, that when the President proposed a pay freeze, the employees were essentially "we understand, we've got a deficit problem, we've got a crisis, we've got to do something about it." Now that the pay freeze is not going to reduce the deficit, that DOE and the labs are looking at different areas that they can spend that money that was saved in the pay freeze. At least we all know money is fungible, but that's the concern that I hear from an awful lot of employees across the DOE complex. How are you addressing that?

Secretary CHU. Yes, what is happening is that we felt that if the federal workers were going to get this freeze on their cost of living, we thought it would be appropriate for the labs to do this. And we're also very, very sensitive to the fact I think as you said that we will still need the ability to recoup the next generation of bright stars and retain the ones we have. But the other thing—and this goes back to what I really want to do so I said, look, I put myself in the shoes of a laboratory scientist, which I was one, and I said okay. The government says we have a pay freeze. We have to actually—since we have federal workers that are subject to this—but nevertheless, that money can be used to invest in the things, for example—we gave examples it was up to them, the laboratory directors, but they could invest in projects where if they invested in that, they could achieve efficiencies that would decrease their operating expenses going forward so that the indirect costs of the work can be diminished. It could be put into directed research programs like LDRD. It could be put in anything like that that would go directly into one's work. Scientists are a strange lot. When I was a professor at Berkeley—not Berkeley, Stanford—we get nine months of salary and then if we can raise money, we can pay up to three months of salary, summer salary. And many of us, including myself, in many instances felt we had the grants, we could pay ourselves summer salaries, but we'd rather not pay ourselves one or two months so that we can actually hire another graduate student or two. Because we viewed our grant money almost like our personal money; it's just part of us. And so the idea here is the scientists and the engineers in the national labs for the large part are truly committed individuals who want to do what they want to do in terms of science and forward their work and the very important missions. And so it takes their money then goes into the things they really care about.

Mr. SIMPSON. I am talking about the everyday employees at the site——

Secretary CHU. Mm-hmm.

Mr. SIMPSON [continuing]. At the different sites we go around to.

Secretary CHU. Right.

Mr. SIMPSON. Cooks, fuel handlers, general—you name them. There are a ton of employees out there that are just everyday laborers and they are looking at, as I said, a pay freeze, which they were willing to accept because they realized the nation is in a tough situation. And they are willing to say okay, I am willing to forgo any pay increases to reduce our salary—to reduce our deficit, small as that might be, but yet that is where it was going to go.

Secretary CHU. Mm-hmm.

Mr. SIMPSON. But now it is being used for other purposes within the labs in DOE. That is a perception problem we have with employees. That needs to be addressed by the Department somehow. And I realize that, you know, shifting that over and using it to reduce costs reduces your overall budget in other areas. But that is an area that we—that is something that we have got to do. We have got to have a conversation with the employees so that they understand what is going on.

Secretary CHU. Okay, sure.

Mr. FRELINGHUYSEN. Let me, if the gentleman yields. There are some of the workers that Mr. Simpson described that feel they are basically getting the shaft.

Mr. SIMPSON. That is kind of what they feel.

Mr. FRELINGHUYSEN. Yeah.

Mr. SIMPSON. So, they feel like they were being deceived. We are flattening—or we are not giving pay raises so that we can address the budget deficit. I mean, that is why we did it. That is why the President froze salaries. But we are not using that to reduce salaries. We are using that for other purposes within DOE to do this program——

Secretary CHU. Oh, okay, okay. I take your point. We can better communicate what we are trying to do, but going to this larger issue in these very, very tough budget times, and where we might not get all that we ask for——

Mr. SIMPSON. Right.

Secretary CHU [continuing]. It has occurred to us, and so—but we also need to make sure that the enterprise—the most tragic thing you can do is that the infrastructure that actually does the grants and gives out the money and all these other things remains the same size, and the money that goes out to do the enervation to signs and all these other things that will lead to our economic prosperity shrinks. And so we—and so what we are doing in this instance is in many instances I think the lab directors were investing money in things that they could not get the funds for, and they said okay, I can invest in something that will decrease my energy costs. I can invest in something to decrease my business costs, which again means that going into the future the overhead costs are reduced, because we need to constantly push to reduce those so-called indirect costs.

Mr. SIMPSON. I understand that, but you understand the concern——

Secretary CHU. Yes, I understand the concern.

Mr. SIMPSON. Just one last statement probably more than anything else about the budget, overall budget. You have mentioned the focus on clean energy—the renewables, clean coal technology, nuclear power. When you look at the amount of power that is electricity that is generated by nuclear and clean coal technology here by coal technology—fossil fuels, if you will—we are looking at 70 percent of the total electricity generated by that.

When you look at the budget, the increases in this budget are substantial in the solar geothermal wind technologies. While I do not dismiss those, those are a small sliver of the overall energy production in this country.

The investments in what produced the most of our electricity are substantially lower, in fact, either reduced or flattened. That concerns me that our focus is on the small sliver, which will become more important, but it is the huge sliver instead of that small sliver that is producing most of the energy in this country. So, that is a concern that I have that we will be looking at in this budget as we put it together.

Secretary CHU. Thanks.

Mr. SIMPSON. But I thank you for being here today. I know you have taken a long time, and I appreciate it very much.

Secretary CHU. Can I very quickly just make a comment to that?

Mr. FRELINGHUYSEN. Equal time provision still prevails, although the hour is late.

Secretary CHU. Okay. Again, these more traditional forms of energy are older, established technologies, and what we have tried to do is to look forward, and one of the things that we are quite certain will grow, not only grow in the United States but, more importantly, grow in world demand dramatically, and you can make the same argument when we first started to subsidize oil in the beginning part of this—the last century, that was providing much of our energy needs, which we should have been putting more of into wood at that time.

Mr. SIMPSON. Much of it I am not talking about subsidizing. I am talking about the research and development to finish the nuclear cycle and that type of stuff.

Secretary CHU. Right.

Mr. SIMPSON. There is a lot of research and development that needs to be done there, and also clean coal.

Secretary CHU. I agree with you. I agree with you, and clean coal, nuclear. So, we are looking at the growth industries, and what would position the United States to be competitive in the future on a world market in these growth areas? And that is why we are doing what we are doing. That is the overriding principle.

Mr. FRELINGHUYSEN. Thank you, Mr. Simpson.

Mr. Pastor.

I will get to you, Mr. Nunnelee. I apologize. Getting closer.

Mr. PASTOR. With climate change, it is something that we are more and more concerned about, and obviously the carbon footprint we want to lessen. And there are people that support a cap and trade; there are people who support a carbon tax. But there are many people that come into the opinion that we have to reinforce the lessening of carbon footprint.

Have you thought about it, and what has been your recommendation in terms of what do we do to encourage individuals, countries, governments to lessen the carbon footprint and reinforce that idea of reducing carbon?

Secretary CHU. Well, yes, I have thought about it, and what I think is it can be attacked at many, many levels. But I think as the years go by the evidence is increasing, that we are running significant risks in climate change and should do something about it. And because of that, and because of many other things like the prospect that renewable energy could be cost competitive with fossil fuel without subsidy, that many countries, most of all with China, is feeling that this is a great economic opportunity to develop those technologies, especially if they are going to be cost competitive without subsidy.

So, then that starts that race, that race for the electric vehicles, the race for the solar energy that can be dropped by 75 percent, race for the biofuels based on agriculture waste, all those things, energy efficiency, buildings that consume 75 percent less energy, and then any investment you make pays for itself in the first 10 years, which is something that we think, and not only we but many industries in the United States think is achievable.

And so, again, as we do this, it makes our country more competitive. Those—all those things decrease carbon, but it also makes our country economically more competitive. And those are the drivers, and to some who might not put the risks of climate change on the same footing, you do not even have to. You say okay, this is what we need to do to be prosperous in the United States. I happen to think those are two good reasons. Energy efficiency is another very big deal, and so, Americans are beginning to buy smaller, lighter, more fuel-efficient cars. Again, homes and weatherizing homes is another big deal, and we are trying to get out how to give American families the tools they need, give them the financing options they can have. We are developing programs there. If energy savings really mean saving money, then it should pay for itself without any subsidy and we are setting up those programs, because, again, if you need cash—let us say $10,000, to pay for this and pay it over a long-term loan of some kind—and your out-of-pocket expenses are 0 and your monthly expenses are decreased, that is good. And, again, we are establishing pilot programs that will show that.

If we get those activities going, it will take care of itself. So, all of the above we are looking at and trying to get moving. Again, all of this will mean that we are putting the United States in a much more competitive posture. The more efficiently we use the energy we have and the more—the better we develop those sources of energy that decrease our dependency on foreign imports and can hold the energy costs down, these are all good things.

Mr. FRELINGHUYSEN. Okay, thank you, Mr. Pastor.

Mr. Nunnelee.

Mr. NUNNELEE. Thank you, Mr. Chairman.

Mr. Secretary, I could not ask for a better segue into my two simple questions. The Chairman referenced ethanol, and I share the Chairman's concern about a large percentage of our fuel supply competing with the food supply chain. And you just talked about other alternatives. Can you talk specifically about biomass? We seem to be having some success in Mississippi with some biomass: with sawgrass pine. Is that an effective alternative to our dependence on foreign oil that does not compete with our food supply chain?

Secretary CHU. Yes, it can be. It really depends on the technology so that we can develop these forms of biofuels that can, let us say, be profitable at some moderate price, $80 a barrel, $70 a barrel. I think that would be the target, so without subsidy you can actually use these agricultural wastes or things that we do not have very heavy energy inputs in the form of fertilizer and tillage and everything else like that. And that is our goal.

There is a report, now several years old, by Oakridge National Laboratory, that spoke of the billion-ton prospect of doing tons of energy crops designed specifically for producing energy—not food crops that have been used to produce energy but true energy crops and agricultural waste. They talked about a billion tons, America's energy future, say. Well, maybe not a billion, maybe 600 million, a huge number, and if you convert that into how that translates into fuels, this is a very significant part of our total fuel use. So, there are numerous studies from the National Academy of Sciences, from Oakridge National Lab, from when I co-chaired Lighting the Way, transitioned to saving energy. Many, many studies are saying this is a very real possibility. And as I said going back to the research that the Federal Government is sponsoring, I am very encouraged to say that, in the last couple of years this is being brought much, much closer to reality, that we really see that it might happen. But I cannot sit here and promise you in three years or four years this will happen.

But, again, I am very encouraged by companies willing to invest money in pilot plans thinking this is our target, we can produce this at profit at this price. And it is not so far away.

Mr. NUNNELEE. Well, can you address in general, ongoing projects in the Section 1705 Loan Guarantee Program?

Secretary CHU. Yes. There are a number of renewable energy projects that are under consideration. There is a pipeline going forward, as I said in response to an earlier question. We have term sheets out that speak to the balance of that, but those terms sheets are a point of negotiation with the companies. Sometimes they may not come to closure, so we are still going forward and looking at due diligence for other companies.

Again, we think that this is for those people who know these companies, and I talk—as I travel over the country I talk to people who view this as an important part of generating jobs, stimulating companies, getting people to work. But it is a way of doing it that would have lasting impact. We want to invest in companies that will be here tomorrow, the year after, and then for decades to come. And so this is the intent of that program.

Mr. NUNNELEE. All right, Mr. Chu, one final simple question: What can the Department of Energy do? The Federal Government builds a lot of buildings. We talked about energy efficiency. What can you do to help us take advantage of efficiencies developed by new technologies in the building of Federal buildings?

Secretary CHU. Sure. That is where I think we have a great opportunity to show leadership and also to help the government save money. And going back to my theme, we have—the Federal Government is in a unique position in many instances. We build the building, we pay for the maintenance, we are going to be the occupant. So, you do not have to worry about building a building and renting it to someone and that someone else pays for the energy bill. It is all here. And so we can take a long-term view of the lifecycle cost of running that building, building it, operating it, and running it. And for that reason, the government can show very good leadership in designing buildings that are cost-effective. And by cost-effective, I mean that they will more than pay for themselves even if you just let us say you have to spend 5 percent more. You hold that 5 percent additional as—you discount that. If you had to pay a hundred thousand more for something or a million dollars more for something, you could have taken that million dollars, invested it in something, gotten 5 percent, 6 percent return in capital.

So, even when you discount it, what we are saying is now it is possible—we know how to do it in order to make those investments that will more than pay for themselves. And so if they pay for themselves in the first 5, 10 years, then over the 56-year lifetime, the building—it is really good. And so we are very concentrated on showing that the U.S. Government can set the example to show the private sector how to save money. It is about saving money in the end and making money in the end. But you have to get that out that you can actually do this.

Mr. NUNNELEE. I look forward to working with you. Thank you, Mr. Secretary Chu.

Mr. FRELINGHUYSEN. Thank you, Mr. Nunnelee.

Mr. Fattah, batting cleanup.

Mr. FATTAH. Thank you, Mr. Chairman.

One of the buildings we were in at the Sandia Lab was LEED certified, so we appreciate the fact that you are practicing——

Mr. FRELINGHUYSEN. Brought in on cost, as I—or under cost.

Mr. FATTAH. Under cost.

Mr. FRELINGHUYSEN. Which was a——

Mr. FATTAH. See, there you go, and on time.

Mr. FRELINGHUYSEN. I am not sure how many——.

Mr. FATTAH. I just want to say a couple of things. First, when you were talking to Mr. Pastor, you talked about fracking, that they are putting fluids down through these pipes through the water tables. They are putting chemicals down, just so we are clear, which is why we are interested in the safety thereof. I agree with you that, you know, we need to make sure that it is done safely.

But I want to ask a question for the record, and you can supply a response, but in Philadelphia we replaced 90,000 streetlights with energy-efficient bulbs that saves the City of Philadelphia and its taxpayers a million dollars a year from this point forward. This is part of an energy efficiency block grant program. It was authorized by Congress and your department was administering it with ARRA funds. In your budget this year I note no request to continue that program. Given that it has benefited over a thousand cities and counties across the country, reduced their energy bills and allowed local decision-makers to focus on their own needs. For example, in Philadelphia we focused on traffic lights. In Idaho, they focused on issues that would be more appropriate to their region, because they are not interested in traffic lights.

Mr. FRELINGHUYSEN. So, you were focused on brotherly love.

Mr. FATTAH. Yeah. But, I would be very interested in you supplying to the Committee, the decision process that led you to make a request that did not include additional funds for this program.

Secretary CHU. Yes. We know very well that the mayors of cities viewed that as an exceptionally good program and would have liked to have seen it continue. That was started in the Recovery Act. But we decided to make a very tough call on that.

Again, if you think about—we think that the dollars Department of Energy best spent in the energy sector would be in those areas that could make us more competitive in the future, that could actually—again in this very competitive world, flat world out there, and so in those areas, which would lead to the new industries that we could invent here and we can build here and then we can also export globally are the things which will lend, in the long term, to the future prosperity of the United States. So, while those programs are very good and they save money, we are also driving to develop the technologies that will, going back and continuing to emphasize this, that will allow the private sector to save money without assistance. In the next years we know that there is going to be austere budget times, and we are going to have to recognize that. And so we need to do those essential activities that will help the private sector.

Mr. FATTAH. Well, again, you can expound for the record, but the issue here is that we are going to be providing less support for state and local governments. Helping them to better control their energy costs and be more energy efficient may be an important contribution we can make.

So, I want to thank you and ask for more information in the record.

Secretary CHU. Right, and we are glad to give that to you. I think we are looking at programs, and we are not abandoning the states and local governments. What we are trying to do is develop programs that will be extremely highly leveraged and allow them to go forward.

Mr. FRELINGHUYSEN. Okay, Mr. Fattah, thank you. Mr. Secretary, thank you. We have been here for a fairly substantive two and a half hours plus, and as you said, these are austere times and you have asked for some major increases in some areas. But I think, as I said in the beginning, we are not going to have much new money to put out on the table to address of those concerns. But where we have asked questions for the record related to those programs and other issues we would appreciate your responses on a timely basis. And again thank you and your staff for being here.

Secretary CHU. Thank you.

Mr. FRELINGHUYSEN. Thank you for your testimony. We stand adjourned.

QUESTIONS FOR THE RECORD

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

DEPARTMENT OF ENERGY
BUDGET HEARING

MARCH 15, 2011

STATUS OF JAPANESE NUCLEAR REACTORS AND U.S. ASSISTANCE

Subcommittee. Mr. Secretary, the earthquakes and tsunami in Japan are tragedies for the people of Japan, and our hearts go out to them. We have been watching the events since last Friday with great concern, and this subcommittee has been paying close attention to the evolving events at the Japanese nuclear reactors. We know that the teams in Japan have been working extremely hard to safely control the situation at their nuclear plants, and they have been working closely with nations such as ours for assistance. While those events are still evolving, it is important that this subcommittee and the American people understand very clearly what has happened—and what is happening now.

The reactor units at the Fukushima Daiichi plant, and to a lesser extent at the nearby Fukushima Daini facility, are experiencing extremely serious issues in the wake of the tsunami, and we are following them very closely.

Secretary Chu, can you give us a detailed account of what has happened at the affected nuclear power plants in Japan since last Friday? In addition to an overview of all affected reactors, we are, of course, particularly concerned with events at the Fukushima nuclear reactor sites.

Secretary Chu. The information available and our understanding of the situation at Fukushima has changed daily, even hourly, particularly in the early phases of the incident. Conditions on the ground today are different than they were in March, at the time of the hearing. As of March 28, 2011, the following is the Office of Nuclear Energy's understanding of the events that occurred at the Fukushima Dai-ichi nuclear power plant. On March 11, 2011, Japan suffered from one of the largest earthquakes in recorded history. There are currently 55 reactors located in Japan and only a small number were affected by the earthquake. Some executed emergency procedures to safely stop operations including those at Fukushima Dai-ichi. Also, this was done at the reactors at the Onogawa plant which is located even closer to the center of the earthquake than the Fukushima Dai-ichi plant. We have been tracking the status of the Japanese reactors and other nuclear facilities and have detected no problems other than those at Fukusima Dai-ichi.

There are various detailed chronologies of the events at the Fukushima Dai-ichi plant available on the Internet. This includes one prepared by the

Organization for Economic Cooperation and Development Nuclear Energy Agency (OECD-NEA) that can be found at: http://www.oecd-nea.org/press/2011/NEWS-04.html. A high level account of the event includes:

At Friday, March 11, 2011 at 2:36 JST a 9.0 Richter scale earthquake occurred off shore about 100 miles from the reactors. At that time the three of the six reactors at Fukushima Dai-ichi were in operation and those safely shutdown. Also, as a result of the earthquake, the northern Japan power grid was lost and stopped supplying electricity to the reactor cooling water pumps. However, emergency diesel generators started as expected and provided the needed cooling capabilities.

Fifty five minutes later at 3:41 JST an estimated 14-meter tsunami arrived at the plant. The facility was designed to withstand only a 6.5 meter tsunami. As a result of the tsunami, the emergency diesel generators were damaged and subsequently failed. This left the plant with only back-up steam turbines to pump cooling water. These turbines are dependent on battery power to control their operation. These batteries eventually failed after a few hours, and the ability to cool reactor Units 1, 2 and 3 was lost.

As a result of the loss of cooling, the water in the reactors boiled off and the level dropped so that the nuclear cores were uncovered. This allowed the metal cladded fuel pins to melt. It also allowed the zircronium metal to interact with the steam to generate hydrogen. This hydrogen escaped from the reactor vessel and caused explosions on the three reactor buildings.

A different problem occurred in reactor Unit 4. The nuclear core of this reactor was removed to the fuel storage pool at the time of the earthquake and tsunami. It is assumed that the pool was damaged during the event and that cooling water escaped uncovering fuel, leading to a hydrogen explosion. The precise events at Unit 4 are still being investigated.

Since the initiation of the accident at Fukushima Dai-ichi, the workers at the plant have used a wide variety of methods to cool the reactors and the fuel storage pools. This includes the use of seawater, fire trucks, cranes, and concrete pumping trucks. Over time off-site power has been restored and freshwater has replaced seawater for cooling the reactor vessels on Units 1, 2, and 3.

Since the nuclear fuel continues to emit heat, active cooling will be required for several months. For this reason the DOE is working with the NRC and other agencies to provide technical assistance as needed. This will include developing alternatives for longer term cooling solutions as well as ways for the plant to capture, store, and eventually treat the radioactive waste water.

Subcommittee. We see reports today that events are still evolving quickly at the affected Japanese power plants. What is the current status of the affected nuclear reactors, and what challenges are they still facing?

Secretary Chu. The information available and our understanding of the situation at Fukushima has changed daily, even hourly, particularly in this early phase of the incident. Conditions on the ground today are different than they were in March, at the time of the hearing. As of March 28, 2011, the following is the Office of Nuclear Energy's understanding of the events that occurred at the Fukushima Dai-ichi nuclear power plant: The six reactors at Fukushima Daiichi are the main concern. The problem is that the tsunami disrupted on-site power to the reactor cooling systems at a time when no off-site power was available because of the earthquake and emergency diesels failed. Units 1, 2 and 3 are believed to have fuel damage with some core melting likely. Unit 4 had no fuel in it at the time of the earthquake. Units 5 and 6 were not as badly affected by the tsunami, being at a higher elevation, and we do not believe there is any fuel failure in Units 5 and 6. Once the power was disrupted, the plants switched to emergency battery backup power. After the batteries were fully discharged, seawater was pumped into the reactor using connections made to fire trucks. Units 1, 2 and 3 have off-site electricity restored and are using electric pumps to add fresh water to the reactors. It is important that the switch to freshwater was made to prevent excessive salt build up inside the reactor. Unfortunately, efforts to restore the plant have been hampered by the discovery of high radioactivity in water inside and around the turbine buildings. It is a high priority to clean or remove this water so that workers can safely move around the plant and restore the plant systems. The long term outlook for Units 1, 2, and 3 are almost certainly permanent closure. The other Units may be returned to service after appropriate modifications are made to protect against a tsunami of this size. The situation is stabilizing somewhat, but faces continuing significant challenges and will warrant close monitoring for months to come.

The other reactors in Japan have shown no immediate cause for concern in the wake of the natural disasters.

Subcommittee. Mr. Secretary, have there been any minor or major releases of radioactive materials from the involved Japanese reactors? If so, how much of a health concern, if any, are these releases to residents of Japan and to people here at home in America?

Secretary Chu. Yes, as of March 28, 2011 we believe there have been significant leakage of radioactive materials from controlled venting of the affected reactor containments. Some uncontrolled leakage has likely also occurred through penetration seals and/or other as yet unidentified mechanisms, including possible faults in the primary containment. As a precaution, and in accordance with the emergency plan for Fukushima Daiichi, the Japanese Government ordered the evacuation of the local population out to 20km from the site, and people living 20km to 30km from the site were advised to remain indoors. This evacuation and sheltering has been effective as surveys of Japanese children have not recorded health significant doses. Contamination of the Japanese water supply in Tokyo has occurred but has not exceeded legal limits to adults. It has exceeded the legal limits for infant children, prompting local Governments to advise people to use bottled water for their infant children. Since then, the decay of Iodine-131 has made the drinking water safe for everyone. As you might expect, the onsite workers dedicated to mitigating the consequences of this natural disaster have received the most dose. Radioactive water in the basements of the turbine buildings poses a hazard to site workers and must be addressed. As a precaution, U.S. citizens living in Japan were advised by the US Embassy to evacuate the area in a 50 mile (~80km) radius from the plant.

The information available and our understanding of the situation at Fukushima has changed daily, even hourly, particularly in the early phases of the incident. Conditions on the ground today are different than they were in March, at the time of the hearing.

Subcommittee. Explosions affecting the outer containment structures have occurred at three reactors—Fukushima Daiichi Units 1, 2, and 3—following difficulties keeping their cooling systems operational, with additional serious challenges at Unit 4. Can you clarify for us the difference between damage to the reactor core and an explosion affecting the containment structure, and clarify what has happened at the Daiichi units?

Secretary Chu. Fukushima Daiichi Units 1 through 4 are boiling water reactors equipped with Mark I containments. These units consist of four barriers to prevent radioactive material from entering the environment in the event of an accident:

1. Metal cladding of each fuel rod that contains the ceramic fuel pellets and fission product gases.
2. Reactor pressure vessel that contains the fuel (core), reactor coolant water, and steam.
3. Primary containment that contains releases from the reactor pressure vessel. Primary containment consists of an inverted light bulb shaped enclosure surrounding the reactor vessel (dry well) with vent pipes at the bottom that empty to a large donut shaped torus half filled with water (wet well).
4. Secondary containment is the multi-level reinforced concrete reactor building that houses the primary containment and other plant equipment. The top level of the secondary containment also houses large cranes travelling on rails that move heavy equipment during maintenance periods. That top level is enclosed with corrugated sheet metal supported by structural steel.

Based on what DOE knows as of March 28th 2011, the explosions severely damaged the top level of the secondary containment and blew out most of the corrugated sheet metal roof and walls in Units 1, 3, and 4. It is thought that at Units 1 and 3, hydrogen gas was vented out of the primary containment and collected at the top of the secondary containment where it exploded in the presence of oxygen in the air. The explosion at Unit 4 is still under investigation.

These explosions blew out the relatively weak corrugated sheet metal roofs and walls but are not expected to have damaged the reinforced concrete walls in the rest of the secondary containment or any of the primary containment structures.

No damage to the reactor pressure vessel or core is expected due to the hydrogen explosions. However, damage to the fuel is likely due to overheating in cases where the water level in the reactor pressure vessel dropped and exposed the fuel rods.

The information available and our understanding of the situation at Fukushima has changed daily, even hourly, particularly in the early phases of the incident. The situation is different today than it was in March, at the time of the hearing.

Subcommittee. Mr. Secretary, what are we doing to help? What assistance has the administration offered to address the broader devastation from the earthquakes and tsunami, and what assistance have we provided specifically to address challenges at Japan's affected nuclear reactors?

Secretary Chu. As of March 28th, 2011, the Administration is providing a variety of support to the people of Japan to deal with aftermath of the earthquake and subsequent tsunami. The United States Agency for International Development (USAID) coordinated the U.S. government relief effort in Japan and deployed a Disaster Assistance Response Team (DART). USAID was the lead agency coordinating the USG disaster response, and broader questions about other agencies' responses should be directed to USAID or those other agencies, such as the Nuclear Regulatory Commission.

Subcommittee. What federal agencies have been involved, and what specifically has the Department of Energy done to help?

Secretary Chu. The United States Agency for International Development (USAID) coordinated the U.S. government relief effort in Japan and deployed a Disaster Assistance Response Team (DART), including Urban Search and Rescue (USAR) teams to rescue victims. The Department of Defense provided aerial surveillance and monitoring, transport of equipment and Japanese Self Defense Forces, drinking water, and humanitarian supplies.

Department of Energy (DOE) personnel were deployed to Japan to help support the recovery, including technical experts to help stabilize the nuclear reactors at the Fukushima Daiichi site; personnel to conduct aerial and ground based monitoring of radiological and environmental conditions; and to provide liaisons with the US embassy and the Government of Japan. DOE efforts have been coordinated with the Department of Defense, State

Department, Nuclear Regulatory Commission and the U.S. nuclear industry to provide the expertise, equipment and supplies needed to support the recovery actions for the six nuclear reactors located at the Fukushima Daiichi site.

Subcommittee. What additional assistance are we considering that we have not yet offered?

Secretary Chu. Our initial response, as of March 28th, 2011, has been focused on ascertaining the condition of the six reactors at the Fukushima Daiichi site that were most directly impacted by the earthquake and subsequent tsunami and supporting the Government of Japan's efforts to stabilize the reactors in a safe condition and monitor any release of radioactivity. As part of the Administration's efforts to support the Government of Japan, the Department has identified expertise, equipment and tools that could be provided to support the near-term efforts to address their priority needs.

Subcommittee. As a stark reminder of our continued dependence on oil from abroad, the prices of oil and gasoline have skyrocketed amid the instabilities in Africa and the Middle East in recent weeks and months. In just the last two weeks, we've seen the largest one-week increase in the price of gasoline since the first Gulf War. Food and energy prices are increasing, and I don't have to remind you how much increased energy prices weigh on our economy. It's critical that we understand what the Administration is doing to help or hurt this tenuous situation.

I share the grave concerns about the Gulf of Mexico shared by many after events last year, but the Administration's moratorium and increased regulations on offshore drilling have hamstrung our nation's efforts to produce oil here at home—and have cost us thousands of jobs. Secretary Chu, what is the Administration doing to improve the situation?

Secretary Chu. It has been less than a year since the largest oil spill in U.S. history. In that time, this Administration has worked aggressively to implement unprecedented new safety and environmental measures that build on the lessons learned from the Deepwater Horizon oil spill. The Department of the Interior (DOI) has worked with industry to ensure that offshore operators meet the new safety and environmental requirements. Existing offshore oil and gas production was not affected by the deepwater drilling moratorium. Likewise, there was never a moratorium on shallow water drilling, and DOI has continued to regularly review and issue drilling permits for new shallow water wells. In February, oil companies were finally able to demonstrate to safety regulators that the first deepwater containment systems developed were properly designed to contain spills if the worst happens, as it did in the case of the Deepwater Horizon. Based on the availability of this containment capability, since February 28th, DOI has issued a series of deepwater drilling permits after careful evaluation on a case-by-case, permit-by-permit basis.

These efforts are also bolstered by the responsible production on onshore public lands being overseen by DOI. In 2010, the Bureau of Land Management (BLM) held 33 oil and gas lease sales covering 3.2 million acres, and processed more than 5,000 applications for permits to drill (APD) on Federal and Indian lands. In 2011, BLM is scheduled to hold an additional 33 lease sales, and the bureau expects to process more than 7,200 APDs.

Of course production is not just about Federal action. Industry needs to do its part, not only in taking the necessary steps to develop and produce responsibly, but in ensuring that oil and gas lessees use the leases they have. Currently, just 45 percent of all onshore leases are actively producing, and less than 30 percent of the millions of acres under offshore leases are producing. The Administration is also taking steps to provide additional incentives for industry to develop oil and gas supplies from the leases that already are in their hands.
Finally, with respect to oil production last year, American oil production reached its highest level since 2003. Oil production from Federal waters in the Gulf of Mexico reached an all-time high, and, for the first time in more than a decade, imports accounted for less than half of what we consumed.

Subcommittee. How do you believe the Administration's stance on offshore drilling has impacted our capacity to produce oil domestically?

Secretary Chu. The Administration believes that domestic production of oil and natural gas is an integral part of our energy future. With respect to offshore oil and gas development, the Administration has moved as quickly as possible to make sure that future offshore drilling activities are conducted with the best safety measures and technology available, especially in deep water. It has been less than a year since the largest oil spill in U.S. history, and in that time, this Administration has worked aggressively to implement unprecedented new safety and environmental measures that build on the lessons learned from the Deepwater Horizon oil spill. The Department of the Interior (DOI) has worked with industry to ensure that offshore operators meet the new safety and environmental requirements. Existing offshore oil and gas production was not affected by the deepwater drilling moratorium. Likewise, there was never a moratorium on shallow water drilling, and DOI has continued to regularly review and issue drilling permits for new shallow water wells. In February, oil companies were finally able to demonstrate to safety regulators that the first deepwater containment systems developed were properly designed to contain spills if the worst happens, as it did in the case of the Deepwater Horizon. Based on the availability of this containment capability, since February 28th, DOI has issued a series of deepwater drilling permits after careful evaluation on a case-by-case, permit-by-permit basis.

Of course production is not just about Federal action. Industry needs to do its part, not only in taking the necessary steps to develop and produce responsibly, but in ensuring that oil and gas lessees use the leases they have. Currently, just 45 percent of all onshore leases are actively producing, and less than 30 percent of the millions of acres under offshore leases are producing. That is why the Administration is also taking steps to provide additional incentives for industry to develop oil and gas supplies from the leases that already are in their hands.

Finally, with respect to oil production, last year American oil production reached its highest level since 2003. Oil production from Federal waters in the Gulf of Mexico reached an all-time high, and, for the first time in more than a decade, imports accounted for less than half of what we consumed.

Subcommittee. What are you considering doing in the longer-term to help with our systemic problem of dependence on oil, in regards to both oil and gas production? Do you support the use of the Strategic Petroleum Reserve as a short-term attempt at bringing down prices?

Secretary Chu. As President Obama said in his March 11, 2011 News Conference:
"First, we need to continue to boost domestic production of oil and gas. Last year, American oil production reached its highest level since 2003. Let me repeat that. Our oil production reached its highest level in seven years. Oil production from federal waters in the Gulf of Mexico reached an all-time high. For the first time in more than a decade, imports accounted for less than half of what we consumed."

The President also said in his March 30, 2011 speech on Energy: "All these actions can increase domestic oil production in the short and medium term. But let's be clear – it is not a long-term solution. Even if we started drilling new wells tomorrow, that oil isn't coming online overnight. And even if we tap every single reserve available to us, we can't escape the fact that we only control 2 percent of the world's oil, but we consume over a quarter of the world's oil. T. Boone Pickens, who made his fortune in the oil business – and I don't think anybody would consider him unfriendly to drilling – was right when he said that "this is one emergency we can't drill our way out of.""

As for use of the Strategic Petroleum Reserve to bring down prices, DOE monitors oil markets closely and will use the SPR as needed, pursuant to the Energy Policy and Conservation Act (EPCA)(P.L. 94-163, as amended). The Strategic Petroleum Reserve is maintained to address supply disruptions not to manipulate market prices and signals. Further, DOE maintains close contacts with the International Energy Agency (IEA) on this topic and will continue to confer with them on the global oil market impacts of geopolitical events

- To address our long-term energy needs, there is no silver bullet. We are working to reduce America's overdependence on fossil fuels through a variety of ways – increasing domestic production, ramping up alternative fuels, and increasing the efficiency of our vehicle fleet. President Obama has set a goal of reducing oil imports by a third by 2025:
    - First, by increasing safe and responsible oil production here at home. Last year, America's oil production reached its highest level since 2003. But the President believes that we should expand oil production in America – even as we increase safety and environmental standards. The President recently announced additional steps to meet this goal.
    - Second, by investing in domestic, alternative fuels – creating jobs and bringing down prices.
    - And third, by continuing to increase the fuel efficiency in the vehicles we drive – building on the historic, bipartisan car rule achieved under this administration, which will save 1.8 billion barrels of oil and begin to save consumers money at the pump starting this year

CLEAN ENERGY PROGRAMS AND PRIVATE SECTOR RELATIONSHIP

Subcommittee. Mr. Secretary, it's basic common sense that private sector investment drives private sector jobs. The Department's energy efficiency and renewable energy programs, ARPA-E, and the loan guarantee programs all overlap with private sector investments and activities. The Department's activities range from applied research grants in EERE and ARPA-E, to loan guarantees for deploying power plants. Our goal, we must remember, is to help the private sector, not hinder it.

What is the appropriate role of government investment in these areas?

How have you taken into account where Department funding would complement private sector activities, and when it would displace or hinder them?

Secretary Chu. ARPA-E fulfills a critical need for transformational energy technologies. Given the recent surge in energy investments overseas, and unparalleled growth in the global demand for energy resources, the next few decades must be the most innovative period of U.S. history in order to remain competitive in the energy economy of the future. ARPA-E will play a key role in fostering that innovation. The magnitude of this challenge is enormous, as is the opportunity.

ARPA-E identifies and promotes early-stage transformational research and development projects in areas that industry by itself is not likely to support because of technical and financial uncertainty. ARPA-E pursues opportunities that have the promise to make revolutionary advances in breakthrough sciences, translate scientific discoveries and cutting-edge inventions into technological innovations, accelerate transformational technological advances, and ensure U.S. competitiveness and technical lead in developing and deploying advanced energy technologies.

ARPA-E funds early-stage technologies that the private sector deems as 'too risky' in which to invest right now. Projects funded by ARPA-E transition technologies across the "valley of death" in order to reduce investor risk and motivate commercial investment.

Coordination between the Department's basic research and applied technology programs is a high priority for the Secretary of Energy. ARPA-E takes great care to ensure that its projects and programs do not overlap with other DOE programs, but instead complement them in multiple ways. Within DOE, ARPA-E has a unique focus on creating breakthrough energy technologies that do not exist in today's energy market, but if they did, these breakthrough technologies would make today's approaches obsolete and have a huge impact on the commercial market. ARPA-E works in close coordination with DOE's basic science and applied research programs to avoid duplicative research and ensure a balanced research portfolio across the DOE. ARPA-E also seeks to bridge DOE programs and proactively reaches out to form partnerships to transition successful projects to deployment. This coordination occurs at the senior DOE leadership level and staff level with regular and ad hoc planning meetings. In addition, other DOE programs are involved from beginning to end in ARPA-E's program development process—providing technical consultation, co-hosting technical workshops, and serving as reviewers for ARPA-E proposals.

PROPOSED LAYOFFS

Subcommittee. Mr. Secretary, there were press reports last week that you have formed an internal task force to develop plans to lay off significant portions of your workforce. According to these reports, you may lay off as much as 30 percent of your headquarters workforce over 3 years, with additional cuts to your field personnel.

How many people are you planning on laying off, and from what parts of your organization?

Secretary Chu. We do have ongoing activities to identify and implement more effective and efficient ways of conducting our operations and providing business services to our programs. Part of these efforts look at skill mix and mission needs over the long term. At this point, other than the known limited layoffs associated with completion of Recovery Act work involving Headquarters, the Golden Field Office in Colorado, and the National Energy Technology Laboratory locations in West Virginia and Pennsylvania, we are within our budget request and will use both early out and attrition to optimize our work force. The numbers affected by the Recovery Act changes are expected to be less than fifty positions on the federal side, but the exact impact will not be known until the FY-11 and 12 budgets are final.

Subcommittee. How much funding are you attempting to save?

Secretary Chu. There is no specific target other than to make sure we can execute our primary functions and programs as efficiently as possible within the adjustments being debated by Congress. I have, however, challenged our managers to focus on retaining federal talent and reducing reliance on more costly support service contracts. These contracts, while necessary in some instances for independent verification and analysis, should not be used as a permanent staffing solution when we need the government to have and maintain the expertise. Simply put, we are seeking to more effectively manage our use of the contract service contingency.

Subcommittee. Would this funding be used to offset the deficit, or would you try to use it to bump up your programs?

Secretary Chu. The first order of business will be to make sure we can meet the challenges of the FY11 and 12 budgets without impacting the Department's critical federal workforce. Beyond that we will look to improve skill mix and depth in the workforce. We, like many other agencies, have a very senior federal workforce with limited bench strength in a number of hard to recruit areas like nuclear safety, physics, cyber and computer engineering as well as procurement and financial management. Improving this within constrained budgets is a priority for us.

Subcommittee. These layoffs don't seem to be reflected in the fiscal year 2012 budget request. When would they happen?

Secretary Chu. Recovery Act separations, which largely involve the expiration of term or temporary appointments, will be starting this fall as the funding expires. Other workforce shaping efforts, such as skill mix changes and reprioritizing the level of service contracting, will occur as programs implement changes throughout the remainder of 2011 and 2012.

Subcommittee. Mr. Secretary, the difficult process that we have been working through over the last couple of months to cut billions from our spending is intended to reduce our deficit and, for many, the size of government. From what I've heard about your discussions…and this would correspond with how you are mishandling the contractor pay freeze…you intend to simply increase unemployment while not helping either the size of government or the federal deficit. I strongly encourage you to work closely with us before you move forward too quickly on these plans.

Since this proposal apparently wouldn't impact your contractor force, it would reduce the amount of oversight that feds are able to provide. This would fit with other efforts you've made to reduce regulations and oversight of the labs.

Do you think that there is currently too much federal involvement with work going on at the labs with billions of taxpayer dollars every year?

Secretary Chu. Federal involvement needs to be focused on what needs to be done, how safely and efficiently it is done and not how it is done or watching or overseeing every step. To that end I believe we need to refocus our efforts to make sure we are adding value and that every requirement we place on our contractors adds value to the complex, our goals and products. To the extent that we can't assure ourselves that involvement does these things we need to closely examine continued involvement.

For the last two years I have concentrated on transforming how the federal staff performs their responsibilities to improve the delivery of the mission by changing our governance model. This required the development of a more solid partnership between the contractors hired to execute work activities, drive scientific research programs, and technology development and with the federal employees who evaluate the performance of the contractor against contract deliverables and delivery of government required reviews and approvals. This model shifts accountability to the contractors and frees up federal staff to focus on their roles of contract evaluators and mission enablers.

HYDROFRACKING

Subcommittee. Mr. Secretary, hydrofracking for natural gas has been getting a lot of attention lately, and rightly so. The potential for this technology to provide a clean energy source for the country is impressive – some estimate that our country's energy needs could be met for 100 years with natural gas.

Yet, hydrofracking is not without its problems. There's a growing concern that air and water pollution associated with hydrofracking is damaging our health, especially in the east, and undermining the potential of this energy source. As Secretary of Energy, I would think that job-1 would be to help improve the energy independence of this country. Unfortunately, your budget request cuts fossil energy research and development and eliminates all the natural gas programs.

What are the main sources of pollution from hydrofracking, and what is your Department doing to address them?

Secretary Chu. Hydraulic fracturing involves the pumping of a fracturing fluid under high pressure into a formation, such as shale, to generate fractures or cracks in the target rock formation. This allows the natural gas to flow out of the formation and into a production well. Ground water is protected by a combination of the casing and cement that is installed when the well is drilled. Flowback of the fracturing fluid during subsequent production must be managed properly to protect drinking water. The Department will continue to work together with other Federal partners, including EPA and the Department of the Interior, to make sure that this valuable technique can be used safely and in an environmentally sustainable way.

PROPOSED INCREASES TO CLEAN ENERGY PROGRAMS

Subcommittee. Mr. Secretary, the fiscal year 2012 budget request proposes substantial increases for clean energy research, development, and demonstration projects. It adds more than $3.1 billion to these areas, a 45 percent increase over the current levels of funding, including more than $500 million added to Science, $550 million to ARPA-E, and nearly $1 billion to Energy Efficiency and Renewable Energy.

Mr. Secretary, how did you arrive at these levels of increased funding for clean energy research and development? What analysis led you to arrive at these specific increases?

Secretary Chu. The FY 2012 request upholds the President's goals to develop America's competitive edge through strategic investments in our nation's clean energy infrastructure. The Department's mission of addressing America's energy challenges through transformative science and technology solutions requires careful analysis and deliberation to develop a balanced portfolio of basic science and research, development, demonstration and deployment. To ensure the right funding profile is requested DOE uses strategic analysis to identify and prioritize the most appropriate portfolio. This process incorporates in-depth integrated reviews by technical experts and senior leadership with the mindset of a shared vision of the applied energy programs. Coupled with detailed technology-specific road-mapping and analysis these investment decisions are also driven by a comprehensive set of economic, environmental, and energy security mandates.

Subcommittee. At a time when funding increases absolutely must be reserved for the most worthy programs, what analysis and planning have you done to ensure that these large increases can actually be spent in one year?

Secretary Chu. Program managers are held accountable to develop aggressive implementation plans that include both performance and spending objectives. These plans are tracked diligently to ensure funding is spent consistent with the identified objectives throughout the fiscal year.

Subcommittee. In the budget request, you have proposed steep increases for programs like Solar, Vehicle, Building, and Industrial Technologies, while holding back other programs like Water Power and

Hydrogen and Fuel Cell technology research. How were the decisions made to focus the increases on some programs and not on others?

Secretary Chu. The FY 2012 budget request supports the President's goals to develop America's competitive edge through strategic investments in our nation's clean energy infrastructure. The need to exercise budget restraints forced some tough decisions across the Department in FY12. Across the Department, we undertook a thorough analysis to determine what levels of funding could be supported across the complex. With regard to EERE in particular, we rebalanced investments in our FY12 request to reflect a very clear and deliberate strategy to support those areas of science with the most direct impact on the energy, security and environmental missions of the Department.

1703 RENEWABLE LOAN GUARANTEE AUTHORITY

Subcommittee. Mr. Secretary, your loan office provided information to the Committee indicating that over $18 billion of the $18.5 billion in authority for renewable energy projects cannot be used because there is no appropriated credit subsidy. Why is this so, especially recognizing that the authority for nuclear power plants is so much in demand? They also have to pay their subsidy costs, which may be in the hundreds of millions of dollars.

If these projects cannot pay even a small percentage of their overall project costs, should we be backing them with taxpayer dollars?

Secretary Chu. The difficulty we face in using this authority is not that renewables projects "cannot pay even a small percentage of their overall project costs." All of our loan recipients – including renewables projects under 1703 - pay a significant portion of the project costs themselves. In fact, we cannot, under Title XVII, provide guarantees for more than 80% of project costs and frequently fund a lower percentage of total project costs. What some of these projects may have difficulty paying is an upfront credit subsidy cost on top of the project costs – which is currently required under 1703. This may be cost prohibitive to some innovative clean energy companies, which, unlike nuclear companies, are often smaller and more thinly-capitalized.

Subcommittee. This $18 billion in unused authority could be easily used by other technologies. Is that a reasonable thing to pursue?

Secretary Chu. Congress has demonstrated its intent for DOE to use this authority to support energy efficiency and renewable energy technologies. Many of our 1705-eligible projects are also eligible under 1703, and may be interested in pursuing loan guarantees under 1703 after the 1705 program sunsets in September 2011. The remaining EERE authority under Section 1703 would be available to support these projects.

CONTRACTOR PAY FREEZE

Subcommittee. You have already implemented a pay freeze on your contractors, something which I frequently hear about when I visit the sites. While we all must make sacrifices to help reduce the deficit, these people are an invaluable resource for this country. According to your department, more than $100 million was "saved" this fiscal year.

How much of this has been returned to the Treasury to offset the deficit?

So, if I understand this correctly, you are holding back payment to your personnel and spending it on your own priorities?

The people that I've talked with are NOT happy that their sacrifices are not being used to offset the deficit. I would encourage you to address their concerns by ensuring that these salary cuts are put to better use.

Secretary Chu. As you know, the President announced a two-year pay freeze for federal workers late last year. As the bulk of the Department's workforce is contractors, we aimed for parity among our workforce by implementing a similar pay freeze for contractors. Our plan is to use the savings from this freeze to reinvest at the sites in order to accomplish mission work that would otherwise not be able to be completed.

After careful consideration, I made the decision to allow a 1.5% increase in our contractor's special adjustment fund, or the approved compensation increase plan amount, whichever is lower. This action will help achieve parity with Federal employees, many of whom receive step increases. This increase of up to 1.5% will allow contractors the discretion to provide salary increases to employees as they deem appropriate. This will result in a total promotion/special adjustment fund authorization of up to 2% of applicable payroll. For those contractors that have already implemented the salary freeze, the adjustment will apply retroactively. Rest assured, we recognize that our contractors are extraordinarily valuable assets, as are our federal employees. That is why our goal has always been for parity between the two.

ANNOUNCING FUNDING OPPORTUNITIES BEFORE RECEIVING APPROPRIATIONS

Subcommittee. Mr. Secretary, there have been a rash of occasions when the Department of Energy has announced programs or awards that rely on funds not yet appropriated by the Congress. For example, in 2008, the Department announced the Bright Tomorrow Lighting Competition— or "L Prize"—which announced a substantial cash prize to the first organization that submits a light bulb meeting specific requirements.

My understanding is that there are no funds currently set aside or appropriated for this prize. If an entry qualifies, the prize money may be much lower than expected or simply not available. Simply putting "Subject to Appropriations" in the announcement's fine print is simply not adequate, as this practice misleads the public and can stimulate private investment with potentially false promises.

Do you think the Department should be announcing funding opportunities before appropriations are finalized?

Secretary Chu. Due to the time required to develop funding announcements, give interested parties sufficient opportunity to draft well documented applications, engage in merit review of those applications and award funding to successful applicants, the Department (DOE) often has little choice but to announce a funding opportunity prior to completion of the appropriations cycle. However, DOE has a number of measures in place to ensure that, while acting in a timely manner to carry out its programs, DOE does not spend funds ahead of the appropriation process.

First, DOE does not release any Funding Opportunity Announcements (FOAs) involving new starts before completion of the appropriations process. Next, for ongoing initiatives, DOE conducts advance work to ensure continuity of the programs and allows funds to be awarded within a reasonable time period after completion of the appropriations process. For these ongoing initiatives, DOE may release FOAs before the appropriations process is finalized, but conservative numbers are used, derived from indications from Congress. Additionally, DOE states in many locations throughout the FOA that any DOE funding "is subject to annual appropriation." This language emphasizes to prospective applicants that actual award of DOE funds is dependent on Congressional appropriation and all funds may not be secured at the time of issuance of the FOA. The FOAs also make clear DOE could cancel a funding opportunity and that the Department would not be liable for any funds spent by potential applicants in preparing applications. Finally, DOE advises its Congressional appropriators of these initiatives in advance of the release of a FOA.

Subcommittee. How will you ensure that this does not happen at the Department?

Secretary Chu. Due to the time required to develop funding announcements, give interested parties sufficient opportunity to draft well documented applications, engage in merit review of those applications and award funding to successful applicants, the Department (DOE) often has little choice but to announce a funding opportunity prior to completion of the appropriations cycle. However, DOE has a number of measures in place to ensure that, while acting in a timely manner to carry out its programs, DOE does not spend funds ahead of the appropriation process.

First, DOE does not release any Funding Opportunity Announcements (FOAs) involving new starts before completion of the appropriations process. Next, for ongoing initiatives, DOE conducts advance work to ensure continuity of the programs and allows funds to be awarded within a reasonable time period after completion of the appropriations process. For these ongoing initiatives, DOE may release FOAs before the appropriations process is finalized, but conservative numbers are used, derived from indications from Congress. Additionally, DOE states in many locations throughout the FOA that any DOE funding "is subject to annual appropriation." This language emphasizes to prospective applicants that actual award of DOE funds is dependent on Congressional appropriation and all funds may not be secured at the time of issuance of the FOA. The FOAs also make clear DOE could cancel a funding opportunity and that the Department would not be liable for any funds spent by potential applicants in preparing applications. Finally, DOE advises its Congressional appropriators of these initiatives in advance of the release of a FOA.

With regard to the L-Prize award, DOE has set aside $10,000,000 to make such an award.

MARCH 22 LAWSUIT IN DC CIRCUIT COURT

Subcommittee. Mr. Secretary, on March 22, in just a week, the DC Circuit Court will hear opening arguments by representatives of Washington state, South Carolina, and others suing the Department of Energy. They will argue, and I would strongly agree, that the Obama administration overstepped its authority in moving to shut down the Yucca Mountain project. I can only hope that the judicial branch, which fortunately is not reliant on backroom deals for their jobs, will also agree. If the Court rules against the Department, how much funding will you need to stand the Yucca Mountain program back up?

Secretary Chu. The Department is confident that it has fully complied with the law. However, if the Court should issue an Order adverse to the Department, the Department would carefully review the Order and determine how to proceed. The Department has expressed its intent to comply with a final nonappealable Order. Without knowing the details of such an Order and the NRC's licensing board's implementation of the Order, it is impossible to estimate with any certainty how much funding would be needed.

Subcommittee. Will you appeal?

When does this end? From what I've been able to pick up, it seems as if the Administration is pushing to extend the on-site storage of this waste.

Of course, that just opens the United States to more and more lawsuits because of the breach of contracts caused by the Administration's political deal with Senator Reid. Your fiscal year 2010 Financial Report shows the estimated liability our taxpayers are now faced with to be $15.5 billion, an increase of $2 billion over a year ago. Some estimate that this could reach as high as $50 billion. Your Department is charged with defending this policy. How would it affect your budget if you were to pay these penalties, instead of an account in the Treasury?

Secretary Chu. The Department is confident that it has complied with all legal requirements in its orderly shutdown of the Yucca Mountain project and filing its Motion to Withdraw the License Application. If a Court should rule against the Department, the Department would carefully review the ruling and make a recommendation to the Department of Justice as to how to proceed regarding an appeal. If the Department were required to proceed with licensing, the Department estimates that the likely funding needed would likely be less than the $196.8 million received in the FY 2010 budget. The Yucca site is currently in standby with all facilities shutdown.

The Department is committed to pursuing better, more workable alternatives to meet its responsibilities for the safe management and disposal of spent nuclear fuel and high-level waste. To that end, the Department, acting at the direction of the President, has established a Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle. The Commission will provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of spent nuclear fuel and high-level waste. Its interim report is due in July 2011 and its final report in January 2012. When the Commission completes its work and proposes alternative solutions, the Administration will consider proposing new legislation if needed.

Current judgments rendered in the Court of Federal Claims are paid by the Judgment Fund, a mandatory fund administered by the Department of Justice. If those judgments were to be paid out of discretionary appropriations from the Department's budget without a corresponding increase, then difficult trade-offs with other priorities would need to be considered.

SAFETY CONCERNS OF CURRENT UNITED STATES NUCLEAR REACTORS

Subcommittee. Secretary Chu, our thoughts are first and foremost with the people of Japan, and our deepest and most immediate concerns are with Japanese people's safety in the affected areas. We would be remiss, however, if we didn't take a moment with you here today to consider any safety concerns the events in Japan highlight for our own fleet of 104 nuclear power plants, which together have been providing 20 percent of our nation's electricity for decades.

I understand that the combination of automatic reactor shutdown—the intended response to an earthquake of this magnitude—the loss of grid power, and the failure of the on-site backup diesel generators led to the current issues at the Fukushima reactors. Could this combination of events happen in the United States?

Secretary Chu. These catastrophic natural events are very region- and location-specific, based on local geology, meteorology, and many other factors; therefore, it is important not to extrapolate from one location of the world to another when evaluating these natural hazards. However, "the NRC requires that safety-significant structures, systems, and components be designed to take into account:

- the most severe natural phenomena historically reported for the site and surrounding area. The NRC then adds a margin for error to account for the historical data's limited accuracy;
- appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena; and
- the importance of the safety functions to be performed."

(From NRC's "Fact Sheet on Seismic Issues for Existing Nuclear Power Plants.")

Looking at earthquakes specifically, every U.S. nuclear power plant has an in-depth seismic analysis that includes a wide range of geologic and seismic data and a review of the effects of historical earthquakes up to 200 miles away. The plant is then designed and constructed to withstand the maximum projected earthquake that could occur in its area without any breach of safety systems. Each reactor is built to withstand the maximum site-specific earthquake by utilizing reinforced concrete and other specialized materials. Each reactor would retain the ability to safely shut down the plant without a release of radiation. For example, plants in California are built to withstand an even higher level of seismic activity than plants in many other parts of the country. We cannot evaluate the effectiveness of the Japanese plants' actual design against this type of accident scenario until much more is known about what actually occurred inside the plant.

U.S. nuclear power plants are designed to cope with a station blackout event that involves a complete loss of offsite power *and* onsite emergency power. U.S. nuclear plants are required to maintain the plant in a safe condition during a station blackout scenario. Many U.S. nuclear plants installed battery systems that can operate some plant equipment for up to 72 hours. Several plants added additional AC power sources to comply with this regulation.

Subcommittee. We have six nuclear reactors in the United States that use the same reactor and containment structure designs as at Fukushima Daiichi Unit 1, which experienced an explosion affecting the containment structure over the weekend. We also have 23 nuclear power plants that use the same general reactor design—boiling water reactors—and the same containment structure design. We do, however, have an extremely robust system for creating and enforcing safety and security regulations at our nuclear power plants. Do we have more protections than at similar plants in Japan to help prevent the same issues at our reactors?

Secretary Chu. Based on the information available as of March 28th, 2011 the Fukushima Daiichi Nuclear Plant Units 1-3 lost all offsite power and emergency diesel generators as a result of the tsunami. This situation is called "station blackout." U.S. nuclear power plants are designed to cope with a station blackout event that involves a complete loss of offsite power *and* onsite emergency power. U.S. nuclear plants are required to maintain the plant in a safe condition during a station blackout scenario. Many U.S. nuclear plants installed battery systems that can operate some plant equipment for up to 72 hours. Several plants added additional AC power sources to comply with this regulation.

In addition, U.S. nuclear plant designs and operating practices since the terrorist events of September 11, 2001, are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

U.S. nuclear plant designs include consideration of seismic events and tsunamis. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

Subcommittee. The Mark I containment design used in the Fukushima reactors and in many nuclear plants in the United States raised some concerns in the 1970s after safety reviews. What have U.S. regulatory agencies and the nuclear industry done to address specific risks to the Mark I containment identified in those and subsequent reviews?

Secretary Chu. During testing of the Mark III containment design in the 1970s, new forces on the suppression pool were identified that needed to be considered in the existing Mark I containment design. These forces resulted from the venting of the dry well to the suppression pool under accident conditions. A detailed re-evaluation of the Mark I containment design was performed and numerous modifications were made, including:

- Reinforcements to strengthen the torus (welds, supports, tie-downs, and dynamic restraints)
- Reinforcements to strengthen the vent system (stiffeners, bracing, deflectors)
- Vent design improvements to distribute steam bubbles for more rapid condensation and reduced forces on the suppression pool.

Subsequent to these modifications, analyses of severe accident conditions indicated the benefit of hardened vents in the suppression pools of Mark I containments. These would vent hydrogen, steam, and other airborne material from containment to reduce the pressure in containment following a severe accident. Plant operators evaluated their designs and added these hardened vents or demonstrated that sufficient protective measures already existed.

SAFETY OF NEW GENERATION OF U.S. REACTORS

Subcommittee. Mr. Secretary, the nuclear plants most affected by the earthquake and tsunami in Japan are based on designs developed more than 40 years ago. A new generation of reactors is currently moving forward in the United States, to help meet growing energy demands and replace retiring power plants across the country.

Does this new generation of nuclear plants in the United States have the same safety concerns as those affected by the earthquake in Japan?

Secretary Chu. No, because many of the proposed new Gen III and III+ light water reactor designs make use of passive safety features or add additional redundant safety systems. Passive safety features rely on natural forces (such as gravity) rather than engineered safety features (such as mechanical pumps) to deliver cooling water to the reactor core and remove heat from the primary containment. Most of the newer plant designs planned in the U.S. incorporate passive safety systems in which natural circulation replaces recirculation pumps; the number of plant systems and building volumes are reduced; and there are fewer operator actions required in the event of an emergency. In the event of an emergency involving loss of offsite power, both the Economic Simplified Boiling Water Reactor (ESBWR) and AP1000 designs are designed to automatically maintain reactor core and spent fuel pool cooling for at least 72 hours with no offsite power or emergency diesel generators required; whereas the batteries in Japan only lasted 8 hours. In addition, these designs utilize passive systems to capture hydrogen gas and convert it to water without the use of any electrical power. The ESBWR also incorporates advances from the Advanced Boiling Water Reactor (ABWR), which replaced the older technology in use at Fukushima Daiichi. ABWRs use improved electronics, computer, turbine, and fuel technology. The ABWR design includes safety enhancements such as a water makeup system that doesn't require AC power. Finally, a number of companies are moving forward with small modular passively-safe reactors that incorporate features such as integral design for major components and subsurface construction that may provide an additional margin of safety.

Subcommittee. Do the tragic events in Japan raise any doubts for you regarding the future of nuclear power in the United States?

Secretary Chu. The Administration believes nuclear must be part of our energy mix. Nuclear power currently supplies nearly 20% of our domestic electricity needs today. Electricity demand is projected to grow significantly and we need to work toward ensuring future demands are met with clean energy sources.

Our fleet of nuclear power plants has undergone exhaustive study and has been determined to be safe for any number of extreme contingencies. However, we have a responsibility to learn from the types of events that are happening in Japan and to draw from those lessons to ensure the safety and security of the American public. With this in mind, the Nuclear Regulatory Commission (NRC) is undertaking a comprehensive review of the safety of our domestic nuclear plants. The NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in the current fleet of nuclear plants as well as changes that need to be made in future designs and if any changes are necessary to NRC regulations.

The U.S. nuclear industry sets the highest standards for safety and, through their focus on continuous learning, is expected to incorporate lessons learned from the events in Japan into the ongoing process of regulating and overseeing our fleet of existing plants and designing, licensing, and building new nuclear power plants.

Subcommittee. Is the Administration taking any steps to slow or reconsider applications for new plants or plant upgrades?

Secretary Chu. Construction for new nuclear power in the United States is still in the early stages and proceeding in a deliberate fashion. The Nuclear Regulatory Commission (NRC) is currently actively reviewing a dozen applications for combined Construction and Operating Licenses (COLs). NRC has made no indication that these will put on hold.

Two companies have started site preparation and other construction-related activities for new nuclear power plants in Georgia and South Carolina, with the expectation that they will receive their COLs from the NRC within the next year. The nuclear industry fully expects these new reactor projects to proceed. Both of these projects use a light water reactor design with advanced safety features, such as reliance on natural forces like gravity rather than engineered safety features like pumps to deliver water to cool the reactor core. In addition, a number of companies are moving forward with design, licensing, and possibly construction of small modular reactors (SMRs), which also incorporate design features that provide an additional margin of safety. These new plants are designed to be even safer than the existing fleet, which already meets or exceeds all robust requirements necessary to protect public health and safety.

It is certain that lessons can be drawn from the accident at the Fukushima Daiichi plants and its aftermath. The industry has stated there is time enough to incorporate lessons learned from these events during the remaining design, licensing, and construction phases of any new reactors desired by the industry.

CLEAN ENERGY RESEARCH AND DEVELOPMENT

NUCLEAR AND FOSSIL ENERGY OMITTED FROM CLEAN ENERGY INCREASES

Subcommittee. Mr. Secretary, would you count nuclear and fossil energy as clean energy?

Secretary Chu. Yes, I consider both nuclear and certain types of fossil energy such as coal with carbon capture and sequestration and combined cycle natural gas to be clean energy.

Subcommittee. Given that, the budget requests for nuclear and fossil energy research, development, and demonstration are at or below current funding levels. If the budget request reflects the Administration's position strongly supporting clean energy innovation, why have you not included two notable clean energy areas, nuclear and fossil energy, in your increases to clean energy research and development?

Secretary Chu. As previously mentioned, both nuclear and fossil energy continue to be a high priority in accomplishing the Department's mission of addressing America's energy challenges through transformative science and technology solutions.

Within the Fossil Energy program, Carbon Capture and Storage (CCS) activities are strongly supported through the Administration's commitment to the deployment of 5-10 large scale CCS demonstration projects by 2016. These projects include those selected through the Clean Coal Power Initiative (CCPI), Industrial Carbon Capture and Storage (ICCS), and FutureGen programs, all of which are funded completely or partially through the American Recovery and Reinvestment Act.

The FY12 request for the nuclear energy included a pivotal investment in Small Modular Reactors (SMR) to support design certification and licensing activities. This will help accelerate the commercialization and international marketability of NRC approved SMR designs. Additionally, our support for nuclear energy deployment is underscored through a request for an additional $36 billion in loan guarantee authority for nuclear reactors.

Subcommittee. With half of our electricity coming from coal, isn't it only responsible to invest more in making this source of energy cleaner at home?

Secretary Chu. Although the FY12 budget request for Fossil Energy Research and Development (FER&D) is lower than in previous years, the program remains focused on the development of near-term technologies for Carbon Capture and Storage (CCS) for both new and retrofit applications, and advanced power systems which will enable the use of CCS with a lower cost and energy penalty. CCS is strongly supported through the Administration's commitment to the deployment of 5 to 10 large scale CCS demonstration projects by 2016. These projects include those selected through the Clean Coal Power Initiative (CCPI), Industrial Carbon Capture and Storage (ICCS), and FutureGen programs, all of which are funded completely or partially through the American Recovery and Reinvestment Act.

The majority of the research being conducted by the FE R&D program is focused on the development of 2nd generation CCS technologies. These advanced technologies will need to be subsequently demonstrated to enable commercial deployment of CCS in the 2020 timeframe, providing a cost-competitive solution option for low-carbon coal based power generation.

Subcommittee. The Administration has emphasized the importance of clean energy's role in American competitiveness. The nuclear energy industry is at a particularly critical point in that respect: Other nations are moving forward in haste, building new reactors using other countries' designs with parts manufactured in other countries and constructed with other countries workers. We have created the nuclear industry, but now we find our leadership in it at risk.

Likewise, other countries like China are moving forward with massive coal plant expansions and technology development. Half of our electricity comes from coal and 20 percent from nuclear energy, and if we lose the innovation edge in those areas, that seventy percent of our nation's power could be dependent on imported technologies.

In this context, why has the Department omitted these two clean energy areas from its proposed increases in the budget request?

Secretary Chu. DOE believes that clean energy and energy security concerns are sufficiently compelling that all technologies that could make a significant contribution should be considered. Again, the clean coal and nuclear technologies remain critical to the Department's mission and are matched with sizable investments both in the past and in the future. The questions that DOE particularly focuses on in its budget prioritization deliberations include:

What technologies can make the greatest potential contributions to energy goals? In particular would be the goal to catalyze the timely, material, and efficient transformation of the Nation's energy system and secure U.S. leadership in clean energy technologies.

What is the appropriate Federal role, if any, to encourage the development of high priority technologies in a timeframe that is most relevant? It is important to recognize that the level of funding for a technology in a particular year does not necessarily reflect priority. For example, funding for early stage research and development will usually be lower than for technologies in the demonstration stage. Further, in some cases incentives such as loan guarantees may be the most cost-effective strategy (e.g., to encourage construction of new, modern nuclear plants), while direct funding may be the best approach for demonstrating technologies that have no large-scale commercial precedent (e.g., carbon capture and storage).

PROPOSAL FOR THREE NEW ENERGY INNOVATION HUBS

Subcommittee. The Department first requested funds for Energy Innovation Hubs in its fiscal year 2010 request. I support using the best research models to spur innovation, but you're no stranger to the healthy skepticism this subcommittee has expressed towards committing funds to the various new research models before we know how well they work. We funded three hubs in fiscal year 2010 instead of the eight requested, with one central point: Show us they work, and then we can talk about funding more.

Secretary Chu, what results have we gotten from the first round of hubs funded with fiscal year 2010 funds?

Secretary Chu. Three Hubs were funded in FY 2010: the Modeling & Simulation for Nuclear Reactors Hub is the Consortium for Advanced Simulation of Light Water Reactors (CASL) led by Oak Ridge National Laboratory; the Fuels from Sunlight Energy Innovation Hub is the Joint Center for Artificial Photosynthesis (JCAP) led by the California Institute of Technology; and the Energy Efficient Building Systems Hub is the Greater Philadelphia Innovation Cluster (GPIC) for Energy-Efficient Buildings led by the Pennsylvania State University. Each of these awards was based on a rigorous merit review process as defined by the three Funding Opportunity Announcements (FOAs) the Department used to solicit applications. Awards were made in late FY 2010.

In the first seven months of the award, DOE and JCAP have implemented a comprehensive formal oversight plan that establishes annual, rigorous peer review, oral and written reporting requirements, change-control rules, and a performance measurement system. Renovations at the two principle partner institutions have been completed, allowing research to be conducted. Initial research successes are being documented by appropriate mechanisms, including journal publications and invention disclosures.

To date the Modeling and Simulation Hub has also show significant progress and success. The team of industry, university, and national laboratory researchers has worked closely together to define and build code capabilities that will result in a virtual model of an operating TVA pressurized water reactor. The first concrete result of this work was delivered on March 31, 2011 with the delivery of version 1.0 of the virtual reactor capability. This capability was demonstrated at the Hub collaboration center dedication that was held on May 3, 2011.

Subcommittee. Are the three hubs operational? Have the full research teams been assembled and moved in to their research offices yet?

Secretary Chu. All three Hubs have moved rapidly following the award into operations. As dictated by the three funding opportunity announcements, no new construction is allowed under a Hub award and each Hub is utilizing existing laboratory and office space at its host and partner institutions. In cases where the permanent Hub facility is undergoing renovation, the Hub institutions are providing temporary lab and office space that has allowed each Hub to "hit the ground running," as required by the Department. The level of commitment from the host and partner institutions in each Hub has been remarkable—all are dedicated to the success of the Hub.

JCAP is operational with a current staff of over 60 individuals housed in two principle partner locations. Caltech has provided temporary laboratory space that has been renovated and is in use by JCAP. Permanent space for JCAP at CalTech will be in a renovated portion of the Jorgenson Building. CalTech and the Resnick Institute are providing slightly more than half of the funds for the Jorgenson renovation; DOE has provided the remainder as part of the year-one funding for JCAP. At LBNL, JCAP is currently housed in newly renovated commercial space. It is anticipated that JCAP will occupy a new, permanent building at LBNL in August 2013; this building is funded through private and state sources. Both JCAP locations are equipped with state-of-the-art videoconferencing equipment, enabling continuous communication among all of the JCAP researchers.

Subcommittee. Mr. Secretary, since these hubs are not yet operational, how and when will we know how well each of these three hubs is yielding results? What specific goals and milestones do you have in place, and by what date do you expect to have real science-based evidence that they work?

Secretary Chu. Each of the Hubs is operational. The Department will not tolerate poor performance of a Hub. The Hubs use standard program management tools to track and measure progress toward their stated goals. The Department assesses the effectiveness of the Hubs and technical progress toward their performance measures on an annual basis via rigorous, external peer review. This process has been used to excellent effect for managing the three Bioenergy Research Centers, which were used as models for establishing the Hubs.

The JCAP stated goal is to demonstrate a scalable, manufacturable solar-fuels generator using Earth-abundant elements that, with no wires, robustly produces fuel from the sun ten times more efficiently than (current) crops.

A continuum of results-oriented metrics has been identified by DOE for JCAP. Initial metrics assess management and early operations (establishment of personnel, resources, and other fixed assets) and include an external peer review of JCAP early operations on April 28, 2011. The second set of metrics is output-oriented and includes: research publications, patents, licenses, innovative solar fuels technologies, and the training of next generation energy researchers and technologists. These metrics will be measured throughout the award period. The third set of metrics is outcome oriented, e.g., new industries, jobs created, global market position, and ultimately, the amount of solar fuels produced to meet U.S. and world needs. Assessments of these metrics will also be assessed during the five-year award period, but success in these metrics will likely extend beyond the anticipated life of the award.

Subcommittee. We in appropriations deal in tradeoffs. So most importantly, how will you measure the degree to which the hubs work compared to other ways we could be using the money?

Secretary Chu. The Department recognizes that effective management of scientific programs and projects is critical to the success of research. Each Hub has well-designed operational plans that include provisions for coordination with other basic and applied research and development activities supported by the Department. All Hubs will be subject to regular and rigorous peer review of their research and development program as well as their management structure, policies, and practices. In addition, each Hub has an advisory board that includes industry participation. Each Hub is managed by a separate DOE program office, which is responsible for conducting the site reviews and evaluating the overall success and productivity of the Hub in accomplishing the Department's missions relative to other work they fund in these areas.

Subcommittee. We've often heard the Joint Biosciences Energy Institute, or "J-Bay", used as an example of the first hub. But this research center was created under one roof—and while you're your request in 2010 envisioned hubs under one roof, none of the first 3 hubs are. One is under two roofs separated by 400 miles, one will consist of people scattered across 10 institutions who are rarely under the hub's own roof. Given this critical difference and the scarcity of funding for new activities, why should we fund new hubs rather than taking a prudent approach by waiting to measure the first three hubs' performance?

Secretary Chu. The "one roof" concept emphasizes the importance of research integration to the success of a Hub. In order to be successful, a Hub must achieve a high level of R&D integration and synergy among its researchers, who will span multiple scientific and engineering disciplines. Each of the current Hubs has the three key elements needed for success: a clear lead institution with strong scientific leadership for the Hub a clear commitment to the use of state-of-the-art technology and frequent virtual meetings to enable meaningful long distance collaboration; and a clear organization and management plan for achieving the collaborative and synergistic goals of a Hub and infusing a culture of empowered central research management throughout the Hub. In one of the three Office of Science DOE Bioenergy Research Centers (BRCs), this communication and management is enabled through co-location of researchers "under one roof." In each of the other two, there is a broader geographical distribution of the center's activities, but each still maintains effective communication and management. In all three BRCs, and similarly for a successful Hub, active management by the lead institution is critical in achieving the desired R&D integration and synergy among research efforts.

DUPLICATIVE ETHANOL POLICIES

Subcommittee. A GAO report released two weeks ago highlighted the wasted federal spending associated with duplicative federal policies supporting ethanol and other biofuels. The government spent $5.4 billion on ethanol tax credits in 2010, even while the renewable fuel standard established in laws in 2005 and 2007 have requirements to the same end. I don't have to remind you how large $5.4 billion is relative to, for example, the Department's energy applied research and development budget.

Mr. Secretary, do you believe the ethanol tax credit is beneficial and worth its incredibly large price tag, despite its redundancy with other policies?

Since the GAO highlights that the ethanol tax credit and renewable fuel standard are already duplicative, wouldn't the addition of the reverse auction in your request pile more policies on an already muddled picture?

I'm sure you've seen the shocking recent statistics about the amount of corn being used for ethanol production – 40 percent! Why isn't the Administration voicing concern that such a large portion of our food supply is being devoted to corn ethanol, raising food prices and affecting vulnerable people worldwide? What is the Administration doing to discourage the use of food for ethanol production?

Secretary Chu. Both the ethanol tax credit and the proposed Reverse Auction are important for the goals of increasing the production of starch-based and cellulosic ethanol and lower the cost and price of those products over time. The Reverse Auction is targeting the production of cellulosic biofuels and therefore is not duplicative with other policies and programs.

The Reverse Auction is for cellulosic (non-food sources) – based biofuels and would not have any impact on food prices. It would not increase any biofuels production from current biofuels facilities producing starch-based ethanol or biodiesel. Through its implementation, the Reverse Auction could enable up to 200 million gallons of cellulosic biofuels by making them more competitive with conventional fuels.

The Reverse Auction would only support cellulosic biofuels produced from approved cellulosic feedstocks. The acceptable feedstocks proposed would be required to be domestically available in sufficient quantities to contribute meaningfully to the Renewable Fuels Standard of 21 billion gallons of advanced biofuels by 2022. The acceptable feedstocks would also need to meet the definitions of "renewable biomass" as stated in the Energy Policy Act of 2005, the Energy Independence and Security Act of 2007, and the Food, Conservation, and Energy Act of 2008, Title IX, Sec. 9001.

The types of fuels eligible for consideration as cellulosic biofuel may include cellulosic ethanol, butanol or other alcohols, green gasoline and diesel produced via Fisher-Tropsch synthesis, pyrolysis or other means and other novel fuels derived from cellulosic biomass or algae. The reverse auction, if combined with other policy incentives (i.e. tax credits, etc.) would enable more rapid finance of premiere biofuels plants. Currently, there is not enough access to private capital to build these first-of-a-kind biofuels plants.

QUADRENNIAL TECHNOLOGY REVIEW

Subcommittee. The Department is currently working on a Quadrennial Technology Review, aimed at being a guiding strategy for the Department's programs focused on energy technologies.

How do you see this review fitting in relative to the annual budget request and Department strategic documents?

Secretary Chu. The QTR process will inform the budget planning process within DOE for FY 2013 and subsequent years by providing a framework for our energy challenges and by establishing principles for prioritization within the Department's energy-related activities. The QTR will not provide cost plans, but we do intend to include summary technology roadmaps that can guide portfolio construction as implemented through the normal budget process.

The DOE Strategic Plan, now under revision after a public comment period which ended on March 26, lays out strategic guidelines and management principles for the whole Department, including the basic science, energy, environmental management, and nuclear security missions. By design, the Strategic Plan is largely technology neutral within the energy portfolio (aside from particular targeted outcomes).

Subcommittee. I understand that this review will not have a budgetary plan for programs, but instead will be qualitative and perhaps lay out priorities. If a rapid schedule for creating and releasing the review is the reason for omitting numbers, would it be worth pushing back the schedule in order to include numbers and put some teeth into the review?

Secretary Chu. The Department chose to set the scope of the review to be most effective, not to fit a particular calendar or duration. The review must first establish a framework and principles to guide the Department; these can then be used to shape the portfolio over the next five years. We have an existing budget process, and the DOE-QTR will inform, rather than supplant, that process.

Subcommittee. Will the review look closely enough at programs and areas to recommend program terminations in areas that are underperforming or focusing on low-priority work?

Secretary Chu. The review will look carefully at the technologies that influence the Nation's energy system and examine the ways in which the Department impacts those technologies. It is not a performance review of particular or existing DOE programs. However, the portfolio optimization principles stated in the review's final report could guide the Department to reshape its portfolio, including the phasing out of support for some activities.

ADVANCED RESEARCH PROJECTS AGENCY – ENERGY (ARPA-E) FUNDING

Subcommittee. Mr. Secretary, this request includes $550 million for ARPA-E. Since they haven't received any program funds since fiscal year 2009, when they got $400 million in the ARRA, I'd count this request in the same "massive increase" category as your ask for energy efficiency and renewable energy.

You obviously consider this a successful program, but why? What, precisely, has ARPA-E been able to do with the first $400 million that it received from taxpayers?

What assurance can you give us that the program could handle such a massive increase in a year?

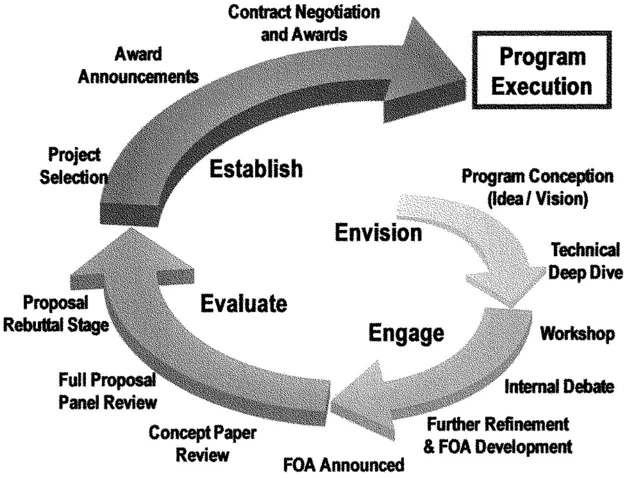
Secretary Chu. Initially funded in FY 2009, ARPA-E is at the forefront of the Department of Energy's efforts to accelerate the pace of innovation. ARPA-E fulfills a critical need for transformational energy technologies. But transformations do not happen overnight – it will take at least 10-15 years to scale these technologies in cost and volume, and indeed change the world.

In the next 3-5 years, ARPA-E can only look for indicators of success: (1) Are we attracting the best minds to energy R&D? Are we getting the best ideas? (2) How many small businesses have been created? (3) Do we have the world's best performance? (4) How many patents have been filed and licensed? (5) If ARPA-E's funding has created value, how much follow-on funding has the private sector made?

With the first $400 million, ARPA-E has issued seven Funding Opportunity Announcements (FOAs) and received an overwhelming response from the technical community. ARPA-E has reviewed 4,786 concept papers and 688 full proposals, from which 121 projects were selected for funding.

ARPA-E is seeing some initial early signs of success. Six projects funded by ARPA-E, at a level of $24M in 2010, have received over $100 in private sector follow on funding. ARPA-E's initial funding allowed these innovators to do the research and overcome some serious technical barriers, ahead of schedule. Through the work funded by ARPA-E, the projects were able to lower the risk and demonstrate results. In addition, we have seen 17 patents filed through ARPA-E funding. While ARPA-E is still in the early stages, but these are good signs for future success.

ARPA-E implemented a novel process for the development and creation of programs that features extensive technical community engagement, topical workshops, a three-stage peer review process that allows for rebuttals to reviewer comments, and rapid contract negotiation, as shown in the figure below. This process has earned ARPA-E accolades, most notably from the President's Council of Advisors on Science and Technology report which recommended that it be instituted Department-wide.



Timeline: 6-8 Months from Program Conception to Execution

Despite its depth of engagement and multi-stage evaluation, this model affords a timeline from conception to execution that is greatly accelerated—typically only six to eight months. This allows ARPA-E to respond rapidly to newly emerging technological discoveries and geopolitical events in its creation of new programs.

ARPA-E prides itself on constant innovation, both in the technologies it seeks to its own business practices. ARPA-E's embedded dedicated legal and procurement teams allows it to achieve an unprecedented pace of transferring awards from announcement to signing cooperative agreements—usually about two to three months—a pace that is uncommon in the public sector. This speed and efficiency of process has been instrumental to ARPA-E's success and reputation.

ARPA-E is well-equipped to handle an increase in funding. ARPA-E successfully responded to the challenge of awarding Recovery Act funds in just 17 months – with only a fraction of current staffing levels – through the creation of a novel process, careful resource allocation, and the efforts of a bright, determined team. The current, expanded ARPA-E team, with its crucial previous experience of creating and managing the seven existing programs, awarding and obligating the Recovery Act funds, and establishing policies and practices, fully intends to obligate and award the entire FY2012 appropriated amount on schedule.

DISRUPTIVE V. INCREMENTAL ADVANCES

Subcommittee. Mr. Secretary, the Department seems to have a bias toward nearly perfect or disruptive technology and in the process sacrifices steady, incremental change that could be transferred to the market place quickly. Excepting out programs like ARPA-E, what is your opinion on the relative weight that should be given to incremental improvements and how is that reflected in this budget request?

Secretary Chu. The Department's budget request strikes the right balance between disruptive and incremental technological improvements. Our research, development, and deployment efforts are focused on the most critical issues in energy science and technology and that are not being addressed by the private sector. The role of ARPA-E is to translate science into breakthrough technologies. This leverages, but does not duplicate, the activity in the Office of Science, which focuses on science and not technology. Furthermore, ARPA-E focuses on developing breakthrough technologies that do not exist today in the energy market and are disruptive. The Applied Energy Programs focus on significantly improving today's technologies thereby making them more compatible with the market.

COMPARATIVE ADVANTAGES FOR TYPES OF TECHNOLOGIES

Subcommittee. Dr. Chu, the Department has long maintained that efficiency and conservation are the cheapest way to make strides in reducing our reliance on imported oil-do you personally agree with this and if so, how does this guide your budget decisions?

Secretary Chu. Energy efficiency is the cheapest and fastest resource available and it can help homeowners and businesses save money, energy and reduce our reliance on imported oil. Our commitment to energy efficiency is reflected in our budget request for the Office of Energy Efficiency and Renewable Energy (EERE). The additional funds we have requested for EERE in recent years continue to deliver more value to the American people each and every year.

Subcommittee. What weight should this factor be given in the applied energy programs? I'll give you an example: I've been told that a relatively modest investment over the next couple of years in the area of solid state lighting would save some $100 billion in energy savings if you assume oil at $100 a barrel.

Secretary Chu. Since one of the missions of the EERE is to save energy, the focus on efficiency (and in the case of lighting, efficacy) must be very high. The Solid-State Lighting (SSL) program is marching toward a goal of 243 lumen/Watt in 2020, relative to the best efficacy of today's traditional sources (linear fluorescent and HID lamps) in the 115 to 125 lumen/Watt range. By funding R&D projects that improve the efficacy of SSL, DOE creates the capability for manufacturers to offer products that save more energy. Saving energy is important; but to save the energy, someone must buy and use the lamp. Thus, the quality of the lighting (such as color rendition) must also be retained. The SSL program supports the efficacy improvements coupled with desirable lighting quality. According to a 20 year forecast prepared for Building Technologies Program entitled *Energy Savings Potential of Solid-State Lighting in General Illumination Applications 2010 to 2030*, the cumulative energy savings from SSL over twenty years are estimated to total about 1,488 terawatt-hours, representing about $120 billion at today's energy prices.

Subcommittee. How would the example above rate relative to the solar or wind program in terms of return on investment?

Secretary Chu. Wind power is an alternative energy *source*, which can be used to displace non-renewable fossil fuels like coal and natural gas. Solid state lighting is a lighting *technology* that can reduce overall electricity use because it is more efficient than lighting alternatives. Wind power does not "save" energy from being used in the same manner as lighting technology, but it does reduce the need for energy from other sources, and has numerous other benefits. Each gigawatt[1] (GW) of land-based wind power added in the United States produces the following benefits versus electricity generation from fossil fuels such as coal and natural gas:

- 1.4 million tons avoided coal consumption per year[2,3] or 21.2 billion cubic feet avoided natural gas consumption per year[4]
- 2.1 million metric tons of avoided carbon dioxide (CO2) emissions per year[5]
- $44 million in avoided social cost of carbon per year[6]
- Wind power also provides significant benefits in the form of avoided health costs from criteria pollutants. About 43% of U.S. wind power offsets coal generation.[7] In 2009, 35 GW of wind power offset roughly 32,000 million kWh of coal generation[8], providing a benefit of $1.0 billion in avoided health costs that year[9]

---

[1] One gigawatt (GW) = one million kilowatts (kW) of electrical generating capacity.

[2] CO2 reduction is based on offsetting the national average marginal power generation mix. NREL memo to DOE, *Onshore wind emissions savings analysis*. January 11, 2011.

[3] *Retrospective Benefit–Cost Evaluation of U.S. DOE Wind Energy R&D Program: Impact of Selected Energy Technology Investments*. U.S. Department of Energy. DOE/EE-0348. June 2010.

[4] *Op. cit.* 2, 3

[5] *Op. cit.* 2

[6] The US Interagency Working Group on Social Cost of Carbon puts central value of carbon at $21 per metric ton of CO2 ($2007) in 2010. Here we calculate that (2.1 million tonnes CO2 avoided/year) x ($21/tonne CO2) = $44.1 million/year. Social costs of carbon include changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services. Human health damages include vector-borne diseases, heat waves, catastrophic events, and cardiovascular and respiratory mortality related to carbon emissions. *Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866*. February 2010. http://www.epa.gov/oms/climate/regulations/scc-tsd.pdf

[7] *Op. cit.* 3

[8] The US produced 74,000 million kWh of electricity from wind in 2009. *Electric Power Annual 2009*. November 23, 2010. http://www.eia.doe.gov/cneaf/electricity/epa/epaxlfile2_1_a.xls

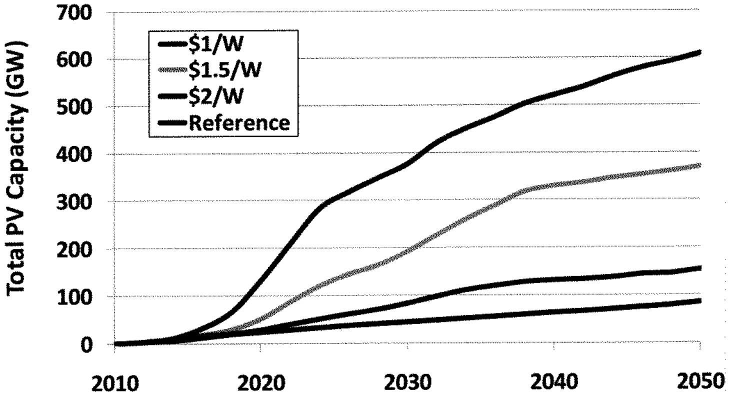
[9] According to the U.S. National Academies of Science, the non-climate damages caused by criteria pollutants from coal-fired power plants in 2005 were estimated at $62 billion per year, or about 3.2 cents per generated kWh. Here we calculate that (73,886 million wind kWh/year) x (43% coal fuel mix avoided) x ($0.032 health benefit/kWh) = $1,024 billion/year in 2009. More than 90% of monetized damages were

Additional benefits of investment in the EERE Wind Program include reductions in the cost of wind energy and reductions in market barriers, both of which hinder deployment of wind power onshore and offshore. Proposed budget levels ($122 million per year) are for technology development to increase reliability of land-based machines and to decrease costs of off-shore wind power.

Through the DOE's SunShot Initiative, the DOE is supporting research, development, demonstration, and deployment of solar energy to make it cost competitive with fossil fuels without subsidies by the end of the decade. This will require approximately a 75% reduction in total installed costs from today's levels for utility scale photovoltaic (PV) systems, from roughly $3.80/Watt direct current (Wdc) to $1/Wdc. Preliminary analysis by the National Renewable Energy Laboratory (NREL) of the impact of achieving these goals indicate that U.S. PV use could grow very rapidly to a cumulative installed capacity of 375 GW by 2030 and 607 GW by 2050. Under this scenario, PV would provide 13% of U.S. electricity by 2030 and 18% by 2050. The increased deployment of PV in the $1/W scenario could reduce retail electricity rates by 1%–3% below the reference scenario projection, representing annual customer savings of $9 billion to $17 billion per year (2009 U.S. dollars) from 2030 through 2050. This would translate into cumulative savings of roughly $80 billion through 2030 and $300 billion through 2050. Economic opportunities resulting from the $1/W scenario could create up to 200,000 gross new full-time jobs by 2030 and 325,000 gross new full-time jobs by 2050. This estimate of gross jobs includes direct and indirect jobs in the solar sector but does not include induced jobs.

---

associated with premature human mortality. *Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use*. National Research Council of the National Academies. 2010.


Total PV Capacity (GW)
700
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
$1/W
$1.5/W
$2/W
Reference

RISING OIL AND GAS PRICES

SELLING OIL FROM THE STRATEGIC PETROLEUM RESERVES

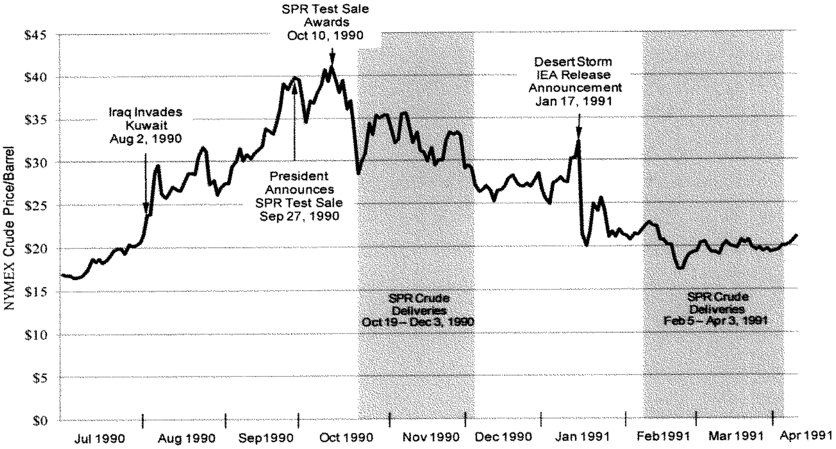
Subcommittee. We've heard much in the press about the possibility of selling oil from the Strategic Petroleum Reserves to ease the impact of rising oil prices on American families and businesses, but we've gotten no clear indication from the Administration. Is the Administration planning to sell oil from the strategic reserves to lower prices?

Secretary Chu. The Administration is monitoring the oil markets and the situation in the Middle East and North Africa very carefully, but any decision to release the SPR would be based on the possibility of a major disruption to oil supplies.

Subcommittee. Are you getting a clear signal from economists as to what the impact of selling oil from the SPR would be?

What historical lessons can we learn from? When sales from the SPR were used to increase supply, what impact did the sale have on price and how long did that impact last before prices rose again?

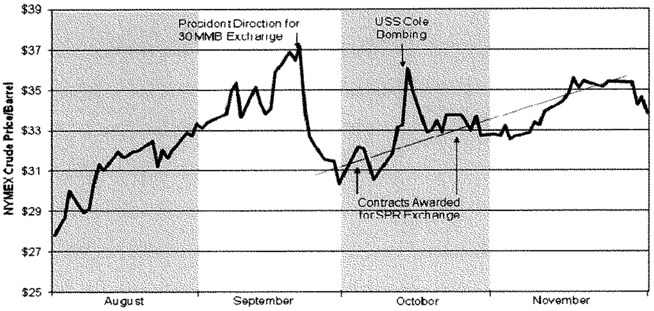
Secretary Chu. Historically, the announcement of a sale from the SPR has had an immediate impact on prices (West Texas Intermediate), which have then leveled off as the physical deliveries were made. For example, prices following the 1990 Test Sale following the Iraqi invasion of Kuwait and subsequent Desert Storm drawdown in 1991 in coordination with the International Energy Agency are illustrated below. (Since announcement of the Desert Storm draw down was made in conjunction with initiation of U.S. military action it is difficult to precisely say to what extent the oil price impact was caused by the coordinated IEA oil sale.)



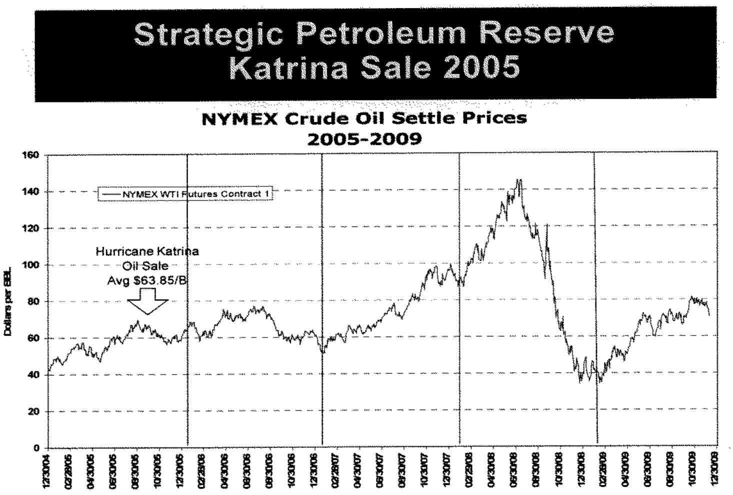
Similarly, in 2000, the exchange of crude oil from the SPR resulted in an immediate drop in price of almost 20 percent, followed by a gradual rise in response to seasonal demand.

SPR Exchange 2000

SPR EXCHANGE 2000
IMPACT ON CRUDE OIL PRICES



Finally, prices fell approximately 10 percent immediately following the Hurricane Katrina release and stayed relatively stable until the spring of 2006.



Strategic Petroleum Reserve Katrina Sale 2005

NYMEX Crude Oil Settle Prices 2005-2009

1

Subcommittee. What would the sale of SPR oil do to the Reserve's inventory? If inventories went down due to this sale, what would we do if a serious disruption occurred to global oil supply?

Secretary Chu. Major impact of the sale of 6 million barrels is that it will reduce the strategic stocks from 75 days to 74 days of import protection. The sale of 6 million barrels from the SPR would reduce the Government strategic stocks from 726.6 million barrels to about 720 million barrels.

Subcommittee. We've heard that OPEC has met to consider increasing its production to compensate for decreased production from Libya and other nations. How is the Administration involving OPEC as it considers taking action?

If the United States sold oil from the SPR, is it possible that OPEC would hold back production to keep prices high?

How does the planned sale of oil proposed in the 2012 budget request to repair one of the oil caverns fit into your decision-making?

Secretary Chu. The 2012 Budget SPR Sale would afford operational flexibility in managing the Reserve. The sale would provide an opportunity to free up space necessary to perform mandatory cavern inspections and workovers and to optimize site operations for cavern maintenance and on-site oil movements that could be required.

Subcommittee. Is the Administration considering moving that sale earlier to ease the oil market?

Secretary Chu. No, the Administration is not considering moving the 2012 Budget SPR sale to FY 2011.

Subcommittee. You'll have to repurchase oil to refill replacement caverns at some point in the future. Why not use the money from the sale to refill the reserve instead of spending it?

Secretary Chu. The SPR is currently filled to its 727 million barrel capacity and no repurchase of crude oil is planned. The receipts from the sale will not be used for the SPR. The receipts from the sale will be deposited into a general fund receipt account and go to the U.S. Treasury. It will not be available for DOE's use.

RUSSIAN ARCTIC OIL EXPLORATION

Subcommittee. Mr. Secretary, many countries are accelerating their efforts in arctic oil exploration.

What is the potential for large energy discoveries in the U.S. arctic continental shelf?

Secretary Chu. In its 2006 National Assessment, the Minerals Management Service (now the Bureau of Ocean Energy Management, Regulation, and Enforcement) provided estimates of undiscovered, technically recoverable oil and gas in the Alaska Outer Continental Shelf. It estimated that the Arctic Subregion, which includes the continental shelf along the Beaufort Sea and the Chukchi Sea, held a mean of 23.75 billion barrels of undiscovered, technically recoverable oil, and a mean of 108.19 trillion cubic feet of undiscovered, technically recoverable gas.

Subcommittee. How do other countries' arctic exploration policies compare to our own?

Secretary Chu. Each of the five Arctic countries' governments supports Arctic oil and gas development.

USA: Onshore oil production in the Alaskan Arctic has been a major component of domestic supplies for decades. In 2009, companies in Alaska produced an average of 645,000 barrels per day of oil, or about 12 percent of all the crude oil produced in the United States. Production occurred mostly in fields on Alaska's North Slope, with smaller amounts in near-shore State and Federal waters. In addition, there is onshore exploration activity taking place within the federally-owned National Petroleum Reserve Alaska. The Department of the Interior has held lease sales for fields on the Outer Continental Shelf (OCS) in both the Beaufort and Chukchi Seas. However, last year's Deepwater Horizon accident has highlighted the importance of careful oversight of safety and environmental issues in OCS oil and gas development.

Norway: Norway's government is promoting increased oil and gas production in its Arctic offshore areas, particularly the Barents Sea, to offset declining production in other areas. Last year, it made 51 new blocks available for licenses in the Barents Sea. The government has also announced plans to acquire seismic information on Norway's recently delineated Barents Sea zone that borders Russia. However, the government still intends to ban exploration activity, until at least 2013, in the environmentally sensitive Lofoten waters despite high interest by oil companies.

Greenland: Although there is not yet any oil or gas production in Greenland, their government supports offshore oil and gas exploration and has held several exploration licensing rounds. As of the end of 2010, companies held about 200,000 square kilometers under license off western and southern Greenland. The Greenlandic government has said it plans additional licensing rounds in 2012 and 2013.

Russia: Russia's *Arctic Policy to 2020* envisions the Arctic as a future base for natural resources production. Russia's Ministry of Natural Resources has put forward in its Offshore Development Strategy a production goal of 1.8 million bpd of oil and 14.5 bcf/d gas from Russia's offshore (mostly Arctic offshore) by 2020. The Russian government has allocated funds for continental shelf exploration and mapping, and marine technology research for Arctic development. Russia has implemented a new tax policy that favors frontier areas such as the Arctic continental shelf, and encouraged foreign companies to participate in Arctic offshore projects such as Shtokman and BP's planned project with Rosneft.

Canada: Although the Canadian government supports oil and gas activity in Canada's Arctic regions, there is only a small amount of exploration activity there. Canada's Arctic regions may remain undeveloped due to their remoteness and lack of transportation options. Canada's National Energy Board initiated an Arctic Drilling Offshore Review after the Macondo accident, but did not restrict offshore drilling.

Subcommittee. How would you compare the environmental effects of oil and gas exploration in other countries' territories to those in U.S. arctic territories?

Secretary Chu.

USA: Onshore oil production activities have been taking place in Arctic Alaska for decades. Although the industry has an overall positive record for safety and environmental management, aging infrastructure has begun to present environmental and operational problems, as seen over the past few years with BP's oil gathering pipelines on the North Slope, and the recent temporary shutdown of the Trans-Alaska Pipeline. The producers and regulators need to make proper maintenance and oversight a priority. Oil and gas development on the Alaskan Outer Continental Shelf (OCS) presents additional challenges, as highlighted by last year's Deepwater Horizon oil spill. Careful oversight of safety and environmental issues is critical as these resources begin to be developed.

Russia: There has been onshore oil and gas production in Russia's Arctic for decades, which has caused a great deal of environmental damage due to lax regulation and enforcement. The worst known accident was the 1994 pipeline rupture in the Komi Republic, which spilled about 1 million barrels of oil into a fragile environment of northern forest and wetlands. There is a concern that Russia's offshore Arctic areas could be developed with poor environmental performance, particularly since Russia has little experience with offshore development. However, in the wake of the Deepwater Horizon accident, Russian government officials have displayed new interest and concern in offshore safety and environmental issues. The Russian government issued new regulations on oil spill prevention and response last year, and the legislature is considering additional measures. Russian government officials have been active in the G-20's Global Marine Environment Protection initiative and are eager to learn from other countries' experiences.

Norway: Although until recently there has only been limited drilling activity in Norway's portion of the Barents Sea, there have been incidents in which companies have spilled oil and/or other chemicals while drilling for or transporting oil. Norway has gone beyond some other countries that produce oil offshore by implementing a "zero-discharge" policy that requires operators to strive for zero or minimal discharges of produced water or drilling fluids into northern waters. The government also temporarily suspended deepwater activity in the wake of the Deepwater Horizon accident. Norway continues to ban activity in the environmentally sensitive Lofoten waters despite high interest by oil companies.

Canada: There is only a small amount of Arctic exploration taking place in Canada. In the wake of the Deepwater Horizon accident, the National Energy Board initiated an Arctic Drilling Offshore Review and is examining all offshore safety and environmental regulations.

NUCLEAR ENERGY

SMALL MODULAR REACTOR COST-SHARE DEMONSTRATION PROJECT

Subcommittee. Mr. Secretary, the budget request slows down one cost-share demonstration project, the Next Generation Nuclear Plant, while it awaits a Secretarial decision and direction on the recommended path forward. At the same time, the budget request proposes to start another cost-share demonstration project for Small Modular Reactors.

Mr. Secretary, can you clarify for the subcommittee what differentiates these two programs that justifies slowing down one and starting another?

Secretary Chu. The key difference between these programs is that light water based Small Modular Reactors (SMRs) have the potential to be commercialized much sooner than gas cooled reactors given that SMRs utilize proven light water reactor technology and have support from a number of companies currently investing in the development of SMR designs. Furthermore, the SMR market is aimed at electrical utilities familiar with commercial nuclear power plants which supports the rapid commercialization with the earliest plants projected for completion in 2020. High temperature gas-cooled reactor technology, such as that being considered for the Next Generation Nuclear Plant project, is in a much earlier stage of development.

Subcommittee. What is different about the Small Modular Reactors demonstration project that will ensure it succeeds where the Next Generation Nuclear Plant has not been as successful?

Secretary Chu. The SMR Licensing Technical Support cost-shared program will focus on licensing-related engineering support to help accelerate commercial deployment of designs that utilize relatively mature light water-based SMR technologies that can be licensed within the existing Nuclear Regulatory Commission (NRC) regulatory framework in a relatively near-term timeframe. It is not a technology demonstration program. In contrast, the Next Generation Nuclear Plant project is focused on demonstrating the viability of an advanced technology.

The private sector is currently funding the development of SMRs, and there has been a great deal of interest on the part of utilities and generation and transmission cooperatives for deployment of SMRs as an option to meet their energy growth requirements and to possibly replace aging generation capacity, primarily coal plants. While some potential end-users of high temperature process heat have expressed interest in gas-cooled reactors, industry has not demonstrated sufficient willingness to appropriately cost share the project. In addition, the concept of and requirements for integrating gas-cooled reactors into those industrial processes are very complex and challenging and will require a much longer learning curve to ensure adequate safety and efficacy.

Subcommittee. What do you see as the biggest risk to the small modular reactor program?

Secretary Chu. It is likely that the largest risks in the SMR cost share program will be the ability of vendors to achieve their cost targets and the uncertainty in the duration of the NRC licensing process. While the technologies employed in these light water-cooled reactors are mature and well-characterized, there are differences inherent to these integral designs that may result in review and analysis on the part of the regulator that requires more time than we have seen for more standard, Generation III+ light water reactors. Any protracted review is likely to be a function of a variety of things such as the vendor's design completeness and the NRC reviewer's familiarity with the SMR design and performance.

Subcommittee. The Small Modular Reactor program moves forward with licensing and engineering on these novel reactors, while also putting funds into research for new small reactor concepts. Is the technology ready and the timing right for small modular reactors?

Secretary Chu. We believe that the light water-based SMR technologies are at a point where certification and licensing are achievable in the timeframes identified in the FY 2012 budget request. DOE will facilitate limited research and development to support licensing needs for up to two light water SMR designs. DOE will also support research and development on advanced technologies and capabilities for advanced SMR designs, such as liquid metal and molten salt-based designs. However, the timeframe for commercialization of these types of plants is years beyond the time frame necessary to license light water SMR and gas-cooled reactor concepts.

Subcommittee. Will the NRC have both the capacity and the willingness to engage with the Department and with industry in the licensing process for these new small reactors?

Secretary Chu. DOE believes the answer is yes however this question should be directed to the NRC for an accurate and more complete answer.

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

ELECTRICITY GENERATION AND FOSSIL ENERGY

Subcommittee. Mr. Secretary, environmental concerns aside, there's no escaping that roughly half of our electricity currently comes from existing coal plants. Several analyses recently have predicted the widespread closure of coal plants starting in 2015 due to EPA regulations. If these analyses are correct, and they seem to largely reach the same conclusions, we're looking at some real problems.

In some areas...the Midwest, Mid-Atlantic, and Texas, especially...over 10% of generation capacity could be closed. Nationwide, as much as 75 gigawatts of electricity may be lost...that's 50 new nuclear power plants, and we're nowhere near building that many. At the very least, electricity prices would skyrocket as more electricity is produced by natural gas. At the worst would be blackouts if existing plants can't keep up with the demand, since it doesn't look likely that enough new capacity can be brought on line so quickly.

You are the Secretary of Energy. What is your plan?

While you are requesting substantial new loan guarantee authority for nuclear plants, there's little likelihood that many of these new plants will come online before the regulations take effect. In the shorter term, it looks to me as if we have to be investing in our current coal and gas fleet. Yet, your budget slashes the fossil energy research and development budget by 28%. How does this make sense?

Secretary Chu. Although the FY12 budget request for Fossil Energy Research and Development (FER&D) is lower than in previous years, the program remains focused on the development of near-term technologies for Carbon Capture and Storage (CCS) for both new and retrofit applications, and advanced power systems which will enable the use of CCS with a lower cost and energy penalty. CCS is strongly supported through the Administration's commitment to the deployment of 5 to 10 large scale CCS demonstration projects by 2016. These projects include those selected through the Clean Coal Power Initiative (CCPI), Industrial Carbon Capture and Storage (ICCS), and FutureGen programs, all of which are funded completely or partially through the American Recovery and Reinvestment Act.

The majority of the research being conducted by the FE R&D program is focused on the development of 2nd generation CCS technologies. These advanced technologies will need to be subsequently demonstrated to enable commercial deployment of CCS in the 2020 timeframe, providing a cost-competitive solution option for low-carbon coal based power generation.

REDUCTION FOR FOSSIL ENERGY RESEARCH AND DEVELOPMENT

Subcommittee. Secretary Chu, the budget request reduces funding for Fossil Energy Research and Development by $183 million below the current level, a 29 percent decrease.

When coal accounts for 50 percent of our nation's electrical power, what is your rationale for reducing funding for research ensuring that we use that vast domestic resource as well as possible?

Secretary Chu. The portion of Fossil Energy Research and Development (FER&D) for Carbon Capture and Storage and Power Systems has decreased in this year's budget request by $102M, or 26 percent, relative to the FY2010 enacted level. The bulk of FE's current R&D program activities focus on: 1) CO_2 capture technology applicable to both new and existing fossil-fueled facilities; 2) CO_2 storage, with emphasis on CO_2 monitoring, verification and accounting; 3) advanced coal-fueled power systems that support carbon capture and storage (CCS), including integrated gasification combined cycle (IGCC) and oxy-combustion technologies; and 4) cross-cutting research to bridge fundamental science and engineering development.

Currently, we are pursuing the integrated demonstration of first generation CCS technologies with existing and new power plants and industrial facilities. These demonstrations are focused on using a range of capture technologies and storing CO_2 in a variety of geologic formations, including enhanced oil recovery. The current portfolio of funded projects is on course to meet the President's goal of bringing five to ten commercial scale demonstration projects online by 2016. In parallel, we are conducting and supporting long-term, high-risk R&D to significantly reduce coal power plant emissions (including CO_2) and substantially improve efficiency to reduce carbon emissions, leading to a viable near-zero atmospheric emissions coal energy system and supporting carbon capture and storage.

The decrease in funding represents the shift in focus toward technologies that have potential benefits to both existing and new fossil-fueled power plants. In addition, recently obligated Recovery Act funding will ensure that development of gasification technologies and hydrogen turbines will continue to advance on or ahead of schedule.

The Department has not requested FY2012 funding for longer-term Solid Oxide Fuel Cells R&D which has been postponed to focus on more near-term CCS technologies.

Subcommittee. The vast majority of the funds requested for Fossil Energy Research and Development focus on carbon dioxide capture and storage. Why does the Department not see value in research aiming to increase the efficiency of or otherwise improve coal power technologies?

Secretary Chu. Despite the majority of funding for Fossil Energy Research and Development (FER&D) being directed towards carbon capture and storage (CCS) applications, several technologies aimed at overall plant efficiency improvements continue to be supported. The primary efforts supported by the Advanced Energy System program include the development of Integrated Gasification Combined Cycle (IGCC) technologies, a relatively new power generation technology. IGCC systems have the potential to achieve much higher efficiencies than standard pulverized coal power plants, and the integration of pre-combustion carbon capture with IGCC systems may prove to be a better means of capturing CO_2 than post-combustion capture. These systems are still in development, and the Department is supporting research in advanced gasification system improvements, high-temperature sulfur removal, and the development of high-hydrogen turbines to further increase system efficiency.

In addition to gasification developments, several programs are targeting existing and new plant efficiencies. Oxy-combustion systems may allow low-cost repowering of pulverized coal facilities to incorporate CCS. Sensors and controls research will allow for greater knowledge of the operations within the plant by providing low-cost means of monitoring plant processes. Finally, the development of oxygen transport membranes could provide oxygen for both gasification and oxy-combustion systems at a lower cost than today's cryogenic systems.

The decrease in funding represents the shift in focus toward technologies that have potential benefits to both existing and new fossil-fueled power plants. In addition, recently obligated Recovery Act funding will ensure that development of gasification technologies and hydrogen turbines will continue to advance on or ahead of schedule.

HYDRAULIC FRACKING AND SHALE GAS

Subcommittee. Mr. Secretary, in just a few years, the development of shale gas resources has dramatically increased projected reserves of natural gas in the United States. We, of course, want to harness this vast resource responsibly and safely, but it has the potential to significantly shift our nation towards more domestically-produced energy resources.

What are relevant federal agencies doing to help develop this relatively new natural resource?

Secretary Chu. Natural gas plays a key role in our Nation's clean energy future and the process known as hydraulic fracturing is one way of accessing that vital resource. The EPA has initiated a study to explore environmental concerns on water resources related to broad application of hydraulic fracturing and the Department of Energy is participating in the study.

Subcommittee. Mr. Secretary, the budget request eliminates two Fossil Energy research programs, Natural Gas Technologies and Unconventional Fossil Energy Technologies, stating only that, "Consistent with Administration policy to phase out inefficient fossil fuel subsidies, the program is requesting no funding…for R&D to increase hydrocarbon production." But two weeks ago, you were quoted as implying that the Department of Energy could offer some assistance to industry for shale gas drilling, saying that, "I think we can help the industry improve what they have."

What do you see as the Department of Energy's role in this area, and how do you reconcile your statement with your proposed elimination of these programs?

Secretary Chu. Consistent with Administration policy to phase out inefficient fossil fuel subsidies, we did not request funding for R&D to increase hydrocarbon production. However, our budget does support DOE's involvement in oil and gas policy development including safety and environmental issues related to offshore drilling and shale gas/hydraulic fracturing. While we continue to request no funding for oil and gas R&D because of the strong commercial motivation to seek new exploration and production technology, our budget allocates funding within the Office of

Policy and International Affairs to maintain DOE's capacity to help inform the policy discussions within the Department and the government more broadly.

Specifically, as stated in the President's *Blueprint for a Secure Energy Future*, DOE's role in this area is articulated as follows:

Setting the Bar for Safety and Responsibility: To provide recommendations from a range of independent experts, the Secretary of Energy, in consultation with the EPA Administrator and Secretary of Interior, should task the Secretary of Energy Advisory Board (SEAB) with establishing a subcommittee to examine fracking issues. The subcommittee will be supported by DOE, EPA and DOI, and its membership will extend beyond SEAB members to include leaders from industry, the environmental community, and states. The subcommittee will work to identify, within 90 days, any immediate steps that can be taken to improve the safety and environmental performance of fracking and to develop, within six months, consensus recommended advice to the agencies on practices for shale extraction to ensure the protection of public health and the environment.

Offering Technical Assistance to State Regulators: States exercise oversight of oil and gas drilling using delegated authority under Federal environmental laws and additional authorities under state law. Some have made more progress than others on enhancing protections to deal with the challenges of fracking. DOE and EPA are establishing a mechanism to provide technical assistance to states to assess the adequacy of existing state regulations. EPA will continue to perform a strong backstop role under Federal environmental laws and will take actions, as necessary, to protect public health and the environment.

Lastly, Section 999 of the Energy Policy Act of 2005 (EPACT) established a mandatory program, the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Program, funded with $50 million each year of diverted Federal oil and gas lease revenues that would otherwise be deposited in the Treasury to offset government-wide expenses. As has been requested since FY 2007, the President's FY 2012 Budget proposes repeal of the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund which was established as part of the Section 999 program. We also are requesting no discretionary funding for R&D to increase hydrocarbon production in the belief that these activities are more appropriately funded by industry. Absent congressional action to repeal this program, DOE is refocusing the work done under Section 999 of EPACT on safety and environmental protection with the funding we continue to receive.

LOAN GUARANTEE PROGRAMS

ADVANCED TECHNOLOGY VEHICLE MANUFACTURING PROGRAM

Subcommittee. Mr. Secretary, in 2008 the Advance Technology Vehicle Manufacturing Program was provided with $7.5 billion to support up to $25 billion in direct loans to manufacturers of advanced technology vehicles and related automotive components. Today, more than two years after this program was first authorized, more than $4.2 billion still remains. Chrysler has famously pulled out of the program, saying it didn't need the support. It seems to me as if the program has essentially stalled.

According to information provided by your Department, you have loaned $8.4 billion from this program to four projects. The largest of these projects was for Ford, at nearly $6 billion. Another $2 billion in projects has been identified, although nothing has been finalized. That makes $10.4 billion in likely commitments that you have shared with the Committee. Are there any other potential projects in the pipeline that we should know about?

Secretary Chu. The ATVM Loan Program has closed five loans totaling over $8.3 billion. We expect that the loans currently in active review would use the majority of our remaining appropriated credit subsidy.

Subcommittee. How much of the appropriated subsidy would you need if all of these projects were actually offered loans?

Secretary Chu. We expect that the projects currently in active review would utilize the majority of our appropriated credit subsidy.

Subcommittee. Your Department has provided other information which says that $17.5 billion, not $10.4 billion, of authority would be used by the end of fiscal year 2011. How do you explain the difference between $17.5 and $10.4 billion?

Secretary Chu. The ATVM Loan Program has closed five projects totaling over $8.3 billion. While it is our policy not to discuss the status of specific applications, we expect that the loans currently in active review would use the majority of our remaining appropriated credit subsidy.

Subcommittee. Given that this program was signed into law under "emergency" authority and how slowly it is now progressing, at what point would you consider it appropriate to return the unused funds to the Treasury?

Secretary Chu. The ATVM Loan Program has a robust pipeline of projects in active review. We expect that the loans currently in active review would use the majority of our remaining appropriated credit subsidy.

FOSSIL ENERGY LOAN GUARANTEES

Subcommittee. Mr. Secretary, you have issued no loan guarantees for fossil fuel plants, even though you have over $8 billion in authority available to you. What's holding up this program?

Secretary Chu. The Department recognizes the importance of advanced fossil projects, and currently has several such projects in due diligence. Each of these projects has a number of open items that will need to be resolved before DOE can determine, as is required by statute, that there exists "a reasonable prospect of repayment of the principal and interest on the obligation by the borrower." Some of these issues involve local and state legislatures or other governing bodies, for which the loan programs cannot force a timetable. That said, it is reasonable to expect that at least some of these projects could receive a loan guarantee, and begin construction, before the end of 2011.

Subcommittee. According to your Department's information, you have $3.2 billion in projects that may be finalized this fiscal year. What is the status of this funding?

Secretary Chu. The Department currently has several advanced fossil projects in due diligence. Each of these projects has a number of open items that will need to be resolved before DOE can determine, as is required by statute, that there exists "a reasonable prospect of repayment of the principal and interest on the obligation by the borrower." That said, it is reasonable to expect that at least some of these projects could receive a loan guarantee and begin construction before the end of 2011.

Subcommittee. You apparently have enough projects identified to use up the rest of the $8 billion, although they're not far enough along in development to finish them by the end of this fiscal year. What is the timeline for these to be completed?

Secretary Chu. It is impossible to predict, with any certainty, the timeline for the remaining projects, as each faces a set of unique challenges and milestones.

GRANT AND AWARD MANAGEMENT

COMMITMENTS TO PRIOR AWARDS

Subcommittee. Mr. Secretary, part of our oversight here is to identify inconsistencies across programs, and to understand whether they are purposeful or signify a lack of uniform management

Among the energy programs, several of the offices award multi-year grants that are paid out using funds from future fiscal years, creating so-called "mortgages" in future fiscal years on past awards. This is true in Energy Efficiency and Renewable Energy, Science, and other accounts. Under this practice, a large portion of fiscal year 2012 funds are tied up in past grants even before the year is started.

In other programs like Nuclear Energy, by contrast, the program awards each grant fully with currently available funding, and so each year is entered "mortgage-free", so to speak. We also hear that ARPA-E would intend to operate like this in 2012 and therefore avoid making commitments with future funds.

Given this inconsistency across programs, is one practice better than the other?

Secretary Chu. A multi-year grant can be either funded on a continuing basis (in which funding is provided in annual increments or budget periods) or fully-funded (in which funding for the full project duration is awarded in a single fiscal year but expected to be spent over the duration of the award). The budget period is the interval of time, specified in the award, into which a project is divided for budgeting and funding purposes. Continuation funding is issued for the succeeding or subsequent budget period(s) after the initial budget period of an approved project. The Office of Science and applied energy programs issue grants using both the continuing and fully funded methods, and each one has its advantages and disadvantages. For grants funded on a continuing basis, while it is our intention at the time of issuance to continue funding the project incrementally until completion, the actual release of continuation funding is subject to availability of funds, receipt and approval of a required annual research performance progress report, DOE's judgment of satisfactory progress on the grant, and compliance with the terms and conditions of the award. This allows DOE to monitor the grant more closely, ensuring that the public good and the mission goals are being served adequately. Submission of an annual progress report and release of funds contingent on progress encourages regular and substantial communication between the grant's Principal Investigator and the DOE Program Manager, allowing course corrections if needed. On the other hand, fully funding has the advantage of minimizing the requirement for out-year commitments, but a program office gives up some leverage in monitoring grants when this is done. This approach also increases the uncosted balances across the Department.

Subcommittee. If both practices have merits, what justifies the difference between the energy programs? What is unique about each account that justifies its different treatment of multi-year awards?

Secretary Chu. The Department has many varied activities and responsibilities that consequently require different funding and management approaches and DOE program offices have flexibility to determine which mechanism is most useful. Multi-year grants that are paid out using funds from future fiscal years are often established to permit the continuity of on-going work. This approach allows, and greatly enhances, the conduct of RD&D activities that cannot be easily started and stopped in sync with a fiscal year. However, some applied energy programs find fully obligating awards without mortgages promotes stability in the science and university community given their specific technology or industry. This approach prevents awardees from the risk of being defunded based on changes in appropriations in subsequent fiscal years. In some cases, such as within the Fossil Energy program, regulation requires all Clean Coal Power Initiative (CCPI) projects to be funded up front.

In particular, the DOE Office of Science financial assistance regulation, 10CFR605.12(b), specifies that a budget period can be 12 months and no more than 24 months long. To forward-fund a grant for more than 24 months thus requires that a waiver be issued by the Director of the Office of Science. Funding a grant on a continuing basis is much more common for the Office of Science than funding one on a forward-funding basis. Other scientific agencies also fund a mixture of the two types of grants (e.g., see National Science Board reports on merit review, http://www.nsf.gov/nsb/topics/MeritReviewReports.jsp, for discussions of standard versus continuing grants).

GAO REPORT ON CONTRACTOR AWARD FEES

Subcommittee. Programs across the Department of Energy have used award incentives to get better performance out of contractors in large construction or procurements contracts. For example, in the Department of Energy's contribution to ITER, the international fusion energy collaboration, are using the practice in an attempt to keep its contractors on schedule and under cost.

While this may be a good practice in theory, a GAO report released last week points out some potentially serious pitfalls and a lack of uniformity across agencies in applying new government-wide guidance.

What is the Department's policy on the use of award fees?

Secretary Chu. The Department's policy on the use of award fees requires work be fixed-price where possible and tied to incentive fees where it is not. Incentive fees must be tied to objective measures to the maximum extent appropriate. The policy requires the contracting officer to use an incentive arrangement or combination of incentive arrangements that motivate the contractor to superior performance. Award fees may only be used when the work to be performed is such that it is not feasible to establish more objective incentives and the likelihood of meeting acquisition objectives will be enhanced by incentives that both motivate the contractor toward exceptional performance and provide the contracting officer the flexibility to evaluate performance and the conditions under which it was achieved. For a more specific discussion, *see* Department of Energy Acquisition Regulation 970.1504-1-2, "Fee Policy" that is, at a minimum, applicable to DOE's management and operating contractors at http://www.gpo.gov/fdsys/pkg/CFR-2011-title48-vol5/xml/CFR-2011-title48-vol5-sec970-1504-1-2.xml

Subcommittee. The GAO report cites one example where, "a Department of Energy research contract allowed the contractor to earn up to 84 percent of the award fee for performance that was defined as not meeting expectations."Are you familiar with this instance, and what have you done to address the concerns in the report?

Secretary Chu. Yes, the Department is familiar with this instance cited in GAO's May 2009 report "FEDERAL CONTRACTING Guidance on Award Fees Has Led to Better Practices but Is Not Consistently Applied." The report was referring to the Office of Science's process, and as the Department stated in its response to the draft of the report, GAO's concern that the Department was paying contractors award fee for unsatisfactory performance was unwarranted. While the statement "... allowed the contractor to earn up to 84 percent of the award fee for performance that was defined as not meeting expectations" is factually supported by the record, it was provided out of context with the overall Office of Science's process established to evaluate laboratory performance and provide performance incentives. The Office of Science process never equated the term "not meeting expectations" with "unsatisfactory performance." The implication of the statement, that is, the Office of Science pays award fee for unsatisfactory performance, was not accurate. The paradigm at the time was that of the Office of Science differentiated between the term "not meeting expectations" and the concept of "unsatisfactory performance" that may have inadvertently led to unnecessary confusion about the rigor of the Office of Science award fee plan standards and evaluation process. In order to remove the confusion and to address GAO's concern, DOE required the Office of Science and all other Departmental offices to use award fee plans that are consistent with FAR guidance, including the requirements that became effective on October 14, 2009, with the issuance of Federal Acquisition Circular 2005-37.

COMMUNICATION ACROSS DEPARTMENT OFFICES

Subcommittee. Mr. Secretary, this subcommittee, among others, have expressed concern for years that the rigid separation between basic and applied research, and among the different program offices in the Department seriously limit the agency's effectiveness. We understand that some efforts have been made during your tenure at the Under Secretary level and otherwise.

What progress have you made in this regard?

Secretary Chu. The processes put in place to drive the integration of research across the Department through the implementation of a variety of crosscutting activities are seamlessly engaging the Acting Under Secretary for Energy.

During the formulation of the FY 2012 budget, the three Under Secretaries undertook an effort to identify important cross cutting research themes where at least two of the three main components of the Department had expertise and joint interest. Three areas in the FY 2012 budget request identified for better coordination are: [1] Energy Systems Simulation for the Internal Combustion Engine, a collaboration between the Offices of Science and Energy Efficiency & Renewable Energy; [2] Materials in Extreme Radiation Environments, a collaboration between Science, Nuclear Energy and NNSA; and [3] Exascale Computing, a collaboration between Science and NNSA.

The Energy Innovation Hubs are another area of close cooperation and coordination between the Under Secretaries for Science and Energy. The concept for each of the Hubs funded to date was reviewed and approved jointly by the Under Secretaries, as was each Hub's Funding Opportunity Announcement and the design and oversight of its peer review process. Ongoing internal oversight of the Hubs continues jointly.

Not all efforts at research integration take place at the Under Secretary level. The strength of the proposal for SunShot, our initiative aimed at making solar energy cost competitive, benefited greatly from the personal engagement of the Directors of ARPA-E and the Office of Science and the Assistant Secretary for Energy Efficiency & Renewable Energy. Program managers across multiple programs meet regularly to coordinate efforts on crosscuts, Hubs, Energy Frontier Research Centers, and other topics of mutual programmatic interest.

Subcommittee. While the two Under Secretaries play an important role in increasing communication and integrating basic and applied research, there has been quite a bit of turnover in the Under Secretary for Energy position during the last year. How is continuity being ensured to move this effort forward?

Secretary Chu. I have set a clear expectation that research planning and implementation will be well coordinated throughout the Department. This is a commitment of mine that all three of the Under Secretaries have carried out. Changes within the Office of the Under Secretary for Energy have not hampered progress.

DEPARTMENTAL MANAGEMENT

GOVERNMENT ACCOUNTABILITY OFFICE (GAO) HIGH-RISK LIST

Subcommittee. Mr. Secretary, once again, the Department of Energy is on GAO's high-risk for project management, just as it has been since the list was begun in 1990.

How would you evaluate the progress the Department has made over the last year in addressing GAO's concerns with respect to management of its projects and contracts?

Secretary Chu. Over the past 2 years, the Department has put measures in place to address the issues identified in the Root Cause Analysis of March 2008 for contract and project management and the remaining two criteria identified by the GAO specific to the Department's high-risk listing. Specifically, the Department has the personnel and budget resources (the capacity) in place to resolve the past contract and project management challenges. In addition, the Department has put in place the required management systems to monitor and independently validate the effectiveness and sustainability of the corrective measures. As a result of enhanced requirements, processes and tools, the Department has documented improved performance for projects baselined since beginning its contract and project management improvement journey in FY 2008. Historically, projects have been delivered in the low to mid 70% success range per the Department's definition of success (project completed within the original approved scope baseline, and within 110% of the original approved cost baseline at project completion). However, at the end of FY 2010, the Department successfully delivered 100% of the completed projects (5 of 5 projects - two construction and three clean-up projects), and is projecting 91% successful delivery at the end of FY 2011 (43 of 47 projects completed in FY08 through FY11). In addition, the Department has certified that 97 percent of DOE capital asset projects use Earned Value Management Systems that comply with the industry standard, ANSI/EIA-748, to track performance.

Subcommittee. What specific steps have you taken over this past year to see that the Department gets removed from the GAO high-risk list?

Secretary Chu. The Department has fully or partially completed all eight corrective measures listed in the Corrective Action Plan of July 2008, which address the most significant issues and associated root causes identified in the Root Cause Analysis of March 2008. Although some remaining work continues in the areas of improving cost estimating and improving project oversight and management, the Department has successfully addressed most of the underlying weaknesses.

Key accomplishments include:

- Improved front-end planning by: requiring sufficient design maturity prior to establishing performance baselines; using industry standard practices such as Technology Readiness Assessment and Project Definition Rating Index tools and Guides to determine projects readiness for baselining; and dividing large programs/projects into smaller, stand alone projects, as appropriate.
- Strengthened project management policy in the newly revised DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, by providing, among others, new cost estimating requirements to include an Independent Cost Review (ICR) at Critical Decision 0, Approve Mission Need, and for capital asset projects greater than $100M an ICR or an Independent Cost Estimate (ICE) at CD-1, Approve Alternative Selection and Cost Range, an ICE at CD-2, Approve Performance Baseline, and an ICE at CD-3, Approve Construction Execution, if warranted.
- Initiated development or revision of several important DOE 413.3 Series Guides regarding cost estimating and project reviews. These guides serve to define an accepted methodology and set of best practices for development of credible contractor, project team, and Program Office cost estimates, and define the objectives and process for ICRs and ICEs.
- Based Order requirements and Guide processes for cost estimating, risk management, ICRs, ICEs, and Technology Readiness Assessments (TRAs) on GAO observations, recommendations, and guidance from audit reports and the *Cost Estimating and Assessment Guide.*
- Implemented Project Peer Reviews across the complex to better monitor project development and execution by leveraging the successful best practices employed by the Office of Science.
- Expanded the breadth and depth in scope of external independent reviews (EIRs) by expanding existing lines of inquiry and adding lines

of inquiry that conform with GAO best practices in the *Cost Estimating and Assessment Guide.*
- Developed a Departmental project team staffing guide to help determine and assess project staff size and required skill set across the life of each capital asset project.
- Established project funding stability by: fully funding capital asset projects with a total project cost less than $50 million; locking down funding profiles at Critical Decision 2, Approve Performance Baseline, and requiring Acquisition Executive approval of any subsequent changes to the profile; and ensuring affordability and adherence to baseline funding profiles for incrementally funded projects in annual budget requests.
- Enhanced senior DOE management dedication and commitment to improving contract and project management through the Department's follow through on actions from the Root Cause Analysis and the Corrective Action Plan, and issuance of a Project Management Principles memoranda from the Deputy Secretary of Energy on March 4, 2010.
- Implemented 7 months ahead of baseline schedule an improved Project Assessment and Reporting System (PARS II) to maintain leadership awareness of project status and to effect appropriate corrective actions in a timely manner.
- Enhanced the Project Management Career Development Program and the Acquisition Career Development Program to improve the training and qualifications of contract and project management personnel.
- Achieved project management professional (PMP) and certified cost engineer (CCE) certifications for project management oversight personnel.

Subcommittee. What further steps do you think will be necessary before the Department will be off the list?

Secretary Chu. The Department not only understands the principles fundamental to effective contract and project management, to include leadership commitment, appropriate management and technical expertise, and disciplined and rigorous implementation of contract and project management policies, but has adopted them and inculcated them into its requirements and processes. As a result, the Department is confident it has turned the corner on its path to improve contract and project management, inclusive of cost estimating. These principles have been and will continue to be aggressively pursued by the Department to ensure project management requirements are consistently followed, oversight of contractors continues to improve, and accountability for performance is strengthened. Based on the outcomes of our Contract and Project Management Summit in December 2010, management attention will remain focused on establishing project priorities within Programs and using those priorities to improve alignment of funding and drive budget decisions, maintaining alignment of project baselines with the contracts through proper change control, improving the Department's ability to hold Federal employees and contractors accountable for project performance, and improving processes for documenting and then using contractor performance evaluations for award fee determinations and future contract source selections.

Since the Department's mission is vital and urgent, rigorous peer review and validated standards will be applied to enhance the Department's ability to deliver successful projects during a time of constrained resources, while performing in a manner that is safe, secure, legally and ethically sound, and fiscally responsible. Ultimately, the Department's effectiveness and success, resulting from teamwork, will be measured by the continued improvement of cost and schedule performance.

DEVOLVING AUTHORITY TO CONTRACTORS

Subcommittee. Mr. Secretary, since you've been in your current position, you've set out to streamline procedures to help contractors. This is something that obviously has been strongly supported by the contracting community. However it has drawn something of a skeptical response in other quarters.

Have you seen any results from these changes yet?

Secretary Chu. Our streamlining efforts have been targeted towards the elimination of non-value added activities for both the federal and contractor processes. We have seen no decrease in the quality of supplies or services as a result of our streamlining initiatives. The Department is committed to ensuring appropriate oversight of our contractors to ensure that we receive full value for our funds and to maintain federal controls. Where appropriate, contractors will be required to assume the risks associated with the work and they will be held accountable for their actions.

Subcommittee. Do you have plans to further streamline the Department's interactions with contractors?

Secretary Chu. The Department will continue to review our processes and procedures to eliminate non value-added activities.

Subcommittee. Given that DOE remains on GAO's high risk list, what do you think the right balance between maintaining strong oversight and leadership and delegating authority and responsibility to the contractors?

Secretary Chu. Strong federal oversight of contractors is imperative, however, contractors must be held accountable for performing the work assigned to them while being allowed the flexibility to determine how to do the work. Our philosophy is consistent with the federal drive to increase performance based contracting and the management techniques associated with that type of procurement. We continually require improvement in our contractor's management systems as well as strengthening our federal oversight under risk based systems where we focus our oversight on those activities that we believe present the highest risk. Where contractors have proven their ability to provide consistently high levels of performance, we will perform less oversight but continually monitor those activities for changes in performance levels.

PENSIONS – OVERALL SITUATION

Subcommittee. Mr. Secretary, this subcommittee has been working with the Department over the last several years to help address your pension problem. A couple of years ago, we provided you with exceptional flexibility to move funding around to adjust to changing market conditions.

Please provide the subcommittee with an update on the pension situation the Department is facing, including your projected future liability.

Secretary Chu. In January 2010, the Department instituted a number of policies including revising the Department's reimbursement policy for pension contributions and strengthening contractor oversight. As a result, we now convene annual pension management meetings to review each plan's funding results and any additional studies that have occurred during the year and a discussions as to what the contractors are doing to remove as much risk from the plans as is practical.

As you are aware, the actual amount of pension contributions is heavily dependent on external market conditions. In November 2010, reasonable estimates of the associated costs of these plans for the period fiscal 2011 through 2014 totaled $6.3 billion. However, based on the most recent pension management process and updated estimates from the contractors the estimates for these plans for the same period totaled $5.3 billion. The substantial decrease in the estimates is primarily due to the favorable asset performance during the 4th quarter of the 2010 calendar year. The Department continues to focus on the issue of the costs of contractor pension plans and consider various options to help control these costs.

Subcommittee. What steps have you taken over the last year to bring this liability down? What benchmark do you use to ensure you are not unfairly cutting the benefits of these employees?

Secretary Chu. The Department has:

- Insisted contractors provide total benefits packages that are comparable to the benefits provided in the market. Benefits packages are equitable if they are no more than 105% of the benefit value and/or cost value of the benefit packages provided by a group of peer companies. . In the past few years, contractors have responded by closing plans to new entrants or modifying existing plans to reduce future benefits for new hires and in some cases for current employees. For example, Sandia Corporation revised the defined benefit formula used to determine future accruals from the highest three-year salary average to career averaging. This measure resulted in a reduction in near-term pension contributions of approximately $100M and significantly reduces the Department's long-term liability.

- Executed a comprehensive annual data call to gather information on all contractor retirement benefit plans.

- Established a centralized storehouse of contractor pension data to provide real-time reporting capabilities and full transparency of data to the Department for oversight activities.

- Revised funding policy to reimburse the minimum contribution required by law, unless the Deputy Secretary determines that an alternate funding strategy is both cost effective and furthers the Department's objective of increasing budgeting predictability while minimizing potential impact to the DOE program.

- Conducted its second annual pension management review of contractor pension plans in early 2011. During this review, eleven contractors proposed alternate funding strategies aimed at reducing the volatility of future pension contributions and increasing the predictability of future pension contributions. Each program office conducted an independent analysis of the requests with their associated plans and determined six of the alternative funding strategies were suitable for approval.

- Initiated the second annual survey of the comprehensive contractor employee benefits analysis which will again be shared with the contractors and programs as well as compared to industry benchmarks. This process continues to encourage contractors to share best practices regarding plan management and communicate the Department's concerns with respect to the costs associated benefits.

PENSIONS – SHARED COSTS AMONG USER AGENCIES

Subcommittee. Within the request for NNSA are two new budget lines, totaling $240 million, to directly pay the pension costs of former University of California NNSA contractors. Why is this amount showing up now?

Secretary Chu. The Department submits a direct request for pension liabilities for legacy pension benefits with the University of California Retirement Plan (UCRP) to fund retirement benefits for University of California (UC) retirees from Los Alamos and Lawrence Livermore National Laboratories. NNSA's contracts for the pension interests retained by the UCRP are with UC. Its contracts for ongoing operations at Los Alamos and Livermore are with the private sector contractors selected to replace UC in 2006 and 2007, respectively. Thus, NNSA is unable to recover the costs for these retirees associated with the liability to the UC through indirect cost pools as NNSA does for pension costs associated with benefit plans sponsored by the current NNSA contractors.

Subcommittee. What is the total liability for this pension plan?

Secretary Chu. The total liability for determining the contributions for these two segments of the UC plans was $6.8 billion as of July 1, 2010 and the corresponding market value of assets for these plans is $4.8 billion; the plans cover approximately 23,000 retired and terminated employees with vested rights.

Subcommittee. How did you determine the split of responsibility between the Weapons and Nonproliferation programs?

Secretary Chu. The split between Weapons and Nonproliferation programs was based on their overall Appropriation Split within the NNSA budget.

Subcommittee. The NNSA labs do work for many government agencies, such as the Defense Department. Costs of current employees who do work for multiple agencies are shared by those agencies based. Did these employee do work for any other agencies besides NNSA, and, if so, has there been any attempt to recoup costs from those agencies?

Secretary Chu. All work done at NNSA sites is charged a standard labor rate that includes the cost of pension benefits. Therefore, costs of employees who do work for multiple agencies all are given the same share of the pension costs. The cost to reimburse the University of California Retirement Plan for retirement benefits for legacy pensions is a direct payment by NNSA, and there is a continuing obligation to fund legacy pension benefits for University of California retirees from Los Alamos and Lawrence Livermore National Laboratories. While it is likely that some employees did work for other agencies, they would have performed such work under agreements that charged an appropriate pension rate at the time the work was contracted and completed. As those agreements were binding for that work at that time, NNSA is unable contractually to recover costs associated with the legacy University of California pension liability from other agencies, which is one of the reasons for the difference between the two payment methods and the disparate treatment in the budget.

PENSIONS – CONSISTENCY ACROSS THE COMPLEX

Subcommittee. With the challenges of pension costs in the last few years, DOE has a much better understanding of the intricacies of each pension program. One of the next challenges the Department seems to facing is increasing healthcare costs. What measures have you taken to understand the cost and assumptions for each lab or major contractor?

Secretary Chu. The Department has:

- Insisted contractors provide total benefits packages that are comparable to the benefits provided in the market. Benefits packages are equitable if they are no more than 105% of the benefit value and/or cost value of the benefit packages provided by a group of peer companies. In the past few years, contractors have responded by closing plans to new entrants or modifying existing plans to reduce future benefits for new hires and in some cases for current employees. For example, Sandia Corporation revised the defined benefit formula used to determine future accruals from the highest three-year salary average to career averaging. This measure resulted in a reduction in near-term pension contributions of approximately $100M and significantly reduces the Department's long-term liability.

- Initiated the second annual survey of the comprehensive contractor employee benefits analysis which will again be shared with the contractors and programs as well as compared to industry benchmarks. This process continues to encourage contractors to share best practices regarding plan management and communicate the Department's concerns with respect to the costs associated benefits. As part of the survey this year, the Department will include a comparison of active and post-retirement medical plans to industry benchmarks and the DOE weighted average.

Subcommittee. Have changes been made a result of this review?

Secretary Chu. At this time, no changes have been made as a result of this review of health care plans.

INDEPENDENT SECRETARIAL REVIEW OF NNSA PROJECTS

Subcommittee. Mr. Secretary, we have heard that in November, you personally undertook a review of the requirements for the two multi-billion dollar facilities that the National Nuclear Security Administration intends to construct. This independent review was to enlist several highly-respected nuclear weapons experts and look at the requirements for the Uranium Processing Facility (UPF) planned for the Y-12 National Security Complex and the Chemistry and Metallurgy Research Replacement-Nuclear Facility (CMRR) that is to be built at Los Alamos National Laboratory. We thank you for your personal involvement in these important projects and are interested in your findings.

Can you give the Subcommittee some insight into this review, and what you've found to be the requirements for these facilities?

Secretary Chu. I asked a distinguished and experienced group of independent experts in the nuclear security field who have no direct connection to these projects to informally provide their views on whether NNSA has identified the proper scope and design of UPF and CMRR. This was not a formal review of the need for these projects, but a request for their individual views on the program requirements for both projects.

Subcommittee. Are you satisfied that the current plans match the capabilities that are needed for the facilities, and that the skyrocketing costs being reported in this budget request are fully justified in order to maintain the safety and effectiveness of our nation's nuclear weapons stockpile?

Secretary Chu. The need for these facilities, their capabilities and associated costs have been reviewed and validated by several review teams since the projects' inception. DOE nevertheless continues to examine the projects to seek more efficient and less costly means for meeting the mission requirements of a safe and effective nuclear weapons stockpile.

Subcommittee. Will the results of your review become publically available?

Secretary Chu. This was not a formal review team, and there is no report or other similar document.

LACK OF STRATEGIC PLANNING

Subcommittee. Mr. Secretary, it has been over two years since you took the oath of office and started this transformation at the Department of Energy, working to advance our energy security, providing leadership and innovation, and targeting our investments to certain activities. As a result, we've seen many new concepts and programs proposed, as well as large growth in certain activity areas. We must come to grips with the growth of the budget in these areas and ask, how increasing investments in these places fits into an overall plan that will advance our nation's prosperity. To support that, we, along with the American people, need to clearly understand the strategy you are following in requesting these large increases.

Yet, two years in, after putting together this budget that asks for more new programs and tremendous increases in certain activities, your Department has yet to produce a formal strategic plan that would articulate to the public your vision of what activities the Department of Energy should be engaging in, how they should be prioritized, and how specifically they advance a vision that is worth investing in.

Further, your budget submission this year actually leaves out the reporting that, while limited in its usefulness in the past, at least attempts to openly show to the public how the programs of the Department of Energy perform against specific goals set for each activity. Instead, you state that your updated measures will be released at a later unspecified date.

Why has it taken you this long to produce a formal strategic plan that clearly explains to the American people how the Department of Energy is working for them?

Secretary Chu. Upon taking office, my first priority was implementation of the American Recovery and Reinvestment Act (ARRA), which channeled an unprecedented amount of funds through the Department in record time. ARRA funding and an increased fiscal year 2009 appropriation, together representing a 187% increase over the prior year, stress-tested every part of our organization—from program managers to procurement and legal staff. Recovery Act projects that are now driving economic growth while laying the foundation for our long-term prosperity through a clean energy economy were the highest priority for staff effort, and I determined that development of a Strategic Plan could wait until the immediate decisions of allocating ARRA funds were largely complete.

The Strategic Plan began to take shape in November 2009, when I called for development of an agency-wide strategy and greater coordination across the Department. The Chief Financial Officer solicited input from the full breadth of programs in the Department and led the development of an early draft. The Under Secretary for Science then led a series of focus groups with leadership and senior career staff from across headquarters and the field to build consensus around the plan's priorities. The document the Department issued for public comment was informed by that feedback, and aims to set out a manageable list of priorities along within some rules and principles that programs should use in developing their implementation plans. Now that the public comment period has ended, we are in the process of reviewing the comments and revising the plan appropriately in response. A final document will be issued shortly.

Subcommittee. Will those measures be available in the next month, in time for consideration of the budget request? If not, how else do you intend to demonstrate that your programs are performing against goals being set for each activity, and that those activities contribute somehow to a larger overall strategy?

Secretary Chu. Yes, the Department's measures will be available in time for consideration of the FY 2012 budget request. The Department is collaborating with the Office of Management and Budget in an effort to improve the quality, transparency, and usefulness of program performance measurement information provided to Congress and the public.

Last spring in preparation for the FY 2012 Congressional Budget Justification, we began the task of improving the quality of our program performance measures to focus on validating results relative to the strategic plan. As a result, our performance measures were reduced from over 400 (input, output, and outcome measures) to around 200 measures which are outcome-focused, results-oriented and closely connected to the targeted outcomes in the DOE draft strategic plan. Our intent is to publish these improved measures on the DOE public website at http://www.energy.gov/about/budget.htm.

STAFFING PROJECT AND CONTRACTOR MANAGEMENT

Subcommittee. The GAO found DOE needs to commit sufficient people and resources to resolve its contract management problems. And the Department's response recognized that having sufficient people and other resources to resolve its contract and project management problems was one of the top 10 issues facing the department Therefore, part of the DOE's corrective action plan for getting off the GAO high risk list was to hire additional personnel with appropriate skills in cost estimating and risk management.

Yet the 2012 request for Departmental Administration is a reduction of 24% from current levels. The Office of Management, responsible for oversight of contract and project management, is reduced by $16million, or 20%. All the while, huge increases are being requested for infrastructure projects and programs which will dole out billions in federal contracts. With these reductions in federal oversight, it is not clear what the Department's strategy is for staffing contract and project management oversight responsibilities.

Is the Department taking the GAO's recommendation to commit resources to resolving its contract and project management problems? Why or why not?

Secretary Chu. The Department has taken specific actions to put in place the personnel and budget resources (the capacity) necessary to resolve past contract and project management challenges. Specific accomplishments include:

- Additional project management professionals with the skills to successfully manage our contracts and project portfolio have been hired (or contracted for). The number of certified Federal Project Directors has increased 34% between 2008 and 2010 (from 255 to 342); additional increases are expected to continue.
- A departmental staffing model has been developed to determine appropriate project staffing levels and an accompanying guide was issued.
- A protocol to evaluate staffing levels during independent project reviews has been implemented.

Despite these efforts, the Department continues to need to identify and obtain sufficient capital asset project and contract management personnel with the skills and experience to manage projects and contracts. To address this issue, the Department will evaluate and determine the best funding strategy for resourcing Integrated Project Teams including contracting professionals for projects. We will also benchmark and analyze best practices for training and incentivizing project and contracting staff. Implementation of these efforts will be coordinated through an Executive Steering Committee with representatives from the Department's project management and contracting communities.

Subcommittee. If not, do you believe the steps you have taken so far without increasing the oversight workforce will be sufficient to get the Department off of the high-risk list?

Secretary Chu. While we continue to work the issue of identifying and obtaining sufficient capital asset project and contract management personnel with the skills and experience to manage projects and contracts, the Department, pursuant to the Root Cause Analysis and Corrective Action Plan, has established other policies and systems to help address its contract and project management and oversight resource (capacity) challenges and to monitor and independently validate the effectiveness and sustainability of the corrective measures, the remaining two criteria identified by GAO for removal from the high-risk list. These other policies and systems include:

- Implementation of a Peer Review process modeled after the best-in-class Office of Science's Lehman Reviews across the DOE complex. Peer reviews are a best practice methodology to augment the project site management and oversight staff. Peer Reviews were mandated by Deputy Secretary policy memo (March 4, 2010) and included in DOE O 413.3B (Nov 29, 2010). Peer Reviews are required at least annually for projects with a total project cost of $100M or greater, and more frequently for projects that are more complex, have a high level of visibility, or are experiencing poor performance.
- Acceleration of the deployment of the new Project Assessment and Reporting System (PARS II). The deployment was completed 7 months ahead of baseline plan—September 2010 vice April 2011—providing consistent, reliable, and auditable data directly from DOE contractors' earned value management systems to all levels of management and oversight from the field to Headquarters.

OFFICE OF COST ANALYSIS

Subcommittee. The Government Accountability Office has concluded and this Committee has previously directed (in fiscal years 2010 and 2011) that the Office of Cost Analysis (OCA) be moved organizationally out of the Chief Financial Officer (CFO), since the CFO is not the correct organization to support Independent Cost Estimates. The direction from this Committee did not prescribe where OCA would be housed, though a direct line to the Deputy Secretary or nested within Office of Engineering and Construction Management were suggested as reasonable alternatives.

However, we now understand this office, instead of being organizationally shifted within the Department as was directed by the Committee, has actually been disbanded and the highly qualified cost personnel have either left the Department or have been given duties in other offices that do not perform cost estimating activities.

Can you give us some background on how you came to this decision and how it improves the Department's capability to perform cost estimating?

Secretary Chu. The duplicative cost estimating and analysis functions of the Office of Cost Analysis were consolidated with the existing functions and mission already in-place within the Office of Engineering and Construction Management (OECM), a part of the Office of Management. OECM is chartered to provide oversight of and establish Departmental policy for project management for the acquisition of capital assets. Under the mantle of the Root Cause Analysis and Corrective Action Plan, corrective measures were identified to improve all aspects of contract and project management, inclusive of cost estimating. A project cost estimate is but one piece of an overall project, and is only as good as the component pieces that make up a project to include upfront planning and design maturity; risk identification and management; stable funding commitments; properly resourced staffing to include numbers and skill sets; credible and consistent contract acquisition, management and alignment; optimized project oversight and reporting; and compliance with Departmental directives. Continued implementation of the entire package of corrective actions taken since the start of the journey to improve contract and project management will improve the Department's capability to perform cost estimating.

Subcommittee. With this decision, hasn't the Department actually lost some of its valuable personnel expertise for conducting cost estimates, exactly what was prescribed as being needed to get the Department off the GAO's high risk list? Or how else do you intend to make up for the loss of expertise through additional organizational reforms?

Secretary Chu. No expertise in cost estimating has been lost with this consolidation of programs that were carrying out the same mission. Because of its charter for oversight of Departmental project management, OECM personnel already had this skill set and it was unnecessary to maintain a redundant capability in another staff office. It is a tenet within DOE Order 413.3B that validation of project cost estimates, whether done via external independent review (EIR), independent cost review (ICR) or independent cost estimate (ICE), are a Federal responsibility. As such reviews and estimates conducted by OECM will be led by the Department's Federal staff certified in cost estimating and engineering (e.g., Association for the Advancement in Cost Engineering (AACE) certification). In addition, the Department is adopting the GAO *Cost Estimating and Assessment Guide* principles and best practices, especially the 12-step cost estimating process in its guidance for developing credible project cost estimates and conducting EIRs, ICRs and ICEs.

CONTRACTOR PENSIONS

Subcommittee. Mr. Secretary, this subcommittee has been working with the Department over the last several years to help address your problems associated with the escalating costs of the Department's contractor employee pension plans.

A couple of years ago, Congress provided you with exceptional flexibility to move funding around to adjust to changing market conditions through a special transfer authority. However, to date, the Department has not used this transfer authority.

It is still unclear what guidelines you have set to manage this continuing problem and control costs.

What steps have you taken over the last year to bring this liability down? Have you applied consistent policies across the sites, or are you primarily delegating the management issue to your contractors? For instance, do all employees contribute the same share of their salaries to their pension plan?

What benchmarks do you use to ensure you are not unfairly cutting the benefits of these employees?

Please provide the subcommittee with an update on the pension situation the Department is facing, including your projected future liability.

Secretary Chu. The Department has:

- Insisted contractors provide total benefits packages that are comparable to the benefits provided in the market. Benefits packages are equitable if they are no more than 105% of the benefit value and/or cost value of the benefit packages provided by a group of peer companies. In the past few years, contractors have responded by closing plans to new entrants or modifying existing plans to reduce future benefits for new hires and in some cases for current employees. For example, Sandia Corporation revised the defined benefit formula used to determine future accruals from the highest three-year salary average to career averaging. This measure resulted in a reduction in near-term pension contributions of approximately $100M and significantly reduces the Department's long-term liability.

- Revised funding policy to reimburse the minimum contribution required by law, unless the Deputy Secretary determines that an alternate funding strategy is both cost effective and furthers the Department's objective of increasing budgeting predictability while minimizing potential impact to the DOE program.Conducted its second annual pension management review of contractor pension plans in early 2011. During this review, eleven contractors proposed alternate funding strategies aimed at reducing the volatility of future pension contributions and increasing the predictability of future pension contributions. Each program office conducted an independent analysis of the requests with their associated plans and determined six of the alternative funding strategies were suitable for approval.

- Conducted its second annual pension management review of contractor pension plans in early 2011. During this review, eleven contractors proposed alternate funding strategies aimed at reducing the volatility of future pension contributions and increasing the predictability of future pension contributions. Each program office conducted an independent analysis of the requests with their associated plans and determined six of the alternative funding strategies were suitable for approval.

- The Department has instituted a common funding policy with respect to the contractor plans which states that the minimum required contribution will be reimbursed with any contributions in excess of the minimum contribution subject to review and approval by the program offices and senior level executives at the Department.

The benefits provided by the contractors' pension plans vary based on the changing workforce needs of the plan sponsors. The actual benefits that are provided are the purview of the contractor, not the Department. The Department is concerned about its contract costs and requires that the contractors measure their plans against a peer group of companies and to maintain benefit packages that are no more than 105% of the benefit value and/or the cost value of the peer group of companies.
There are five plans across the complex, that require employee contributions; the remainder of the plans does not.

NEW PROJECT MANAGEMENT ORDER

Subcommittee. Mr. Secretary, we commend you for taking on a revision of your department's guidance on managing capital projects, and specifically for heeding the calls to improve cost estimating within the Department by adding in requirements for performing independent cost estimates (ICE) before critical milestones are awarded to advance projects. But there is still much to be done. Now that you have embraced the need for cost estimating, we must make sure that this is not just a hollow requirement to produce documentation, but rather becomes an effective tool for making project decisions.

For instance, despite the performance of an independent cost estimate for the NNSA's Pit Disassembly and Conversion project, the Department is requesting $176 million for a project that has not yet achieved its next milestone and remains unable to report its projected costs to Congress – though we understand it is in the billions.

One question to be concerned with is how these independent cost estimates are actually performed, since there are actually several ways you can go about it. We understand that one of the debates within the Department largely centered on these differences. While the Office of Engineering and Construction Management used a bottoms up technique, the now defunct Office of Cost Analysis (OCA) favored a top down approach used by the Department of Defense's office of cost assessment which has proven to be highly successful – so much that a reorganization was directed by Congress to elevate this office organizationally and ensure these techniques were being applied and reported to the highest levels within DoD.

Now that the Department has disbanded the OCA, will you be reconstituting this capability to perform top down estimates?

Secretary Chu. No expertise in cost estimating has been lost with the consolidation of the duplicative cost estimating and analysis functions of the Office of Cost Analysis with the existing functions and mission already in-place within the Office of Engineering and Construction Management (OECM), a part of the Office of Management, which reports to the Deputy Secretary of Energy. Because of its charter for oversight of Departmental project management, OECM personnel already had this skill set and it was unnecessary to maintain a redundant capability in another staff office.

Independent cost estimates conducted by OECM will be led by the Department's Federal staff certified in cost estimating and engineering (e.g., Association for the Advancement in Cost Engineering (AACE) certification) , will be conducted consistent with the GAO *Cost Estimating and Assessment Guide* principles and best practices, especially the 12-step cost estimating process, and will be consistent with the project phase, often based on a top-down parametric cost model or other cost-estimating relationships. If necessary and appropriate, specific elements of a project may be estimated using a detailed, bottoms-up approach.

Subcommittee. If not, can you tell us why the Department will continue using the same estimating techniques that are not doing the job that is needed to advance the major construction projects?

Secretary Chu. With the release of DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital* Assets, on November 29, 2010, OECM is now invested with the authority and responsibility to conduct independent cost estimates at Critical Decision 2, Approve Performance Baseline, which is the commitment DOE makes to Congress on a project's scope, cost and schedule. In the prior directive, an ICE was an option at this stage, but seldom accomplished in lieu of a limited cost review of select elements of the project scope as defined in the work breakdown structure. Independent cost estimates conducted by OECM will be led by the Department's Federal staff certified in cost estimating and engineering (e.g., Association for the Advancement in Cost Engineering (AACE) certification), and will utilize available historical cost data coupled with top-down parametric cost models or other cost-estimating relationships to prepare credible cost estimates. Product-oriented work breakdown structures ultimately standardized to project type will be utilized to collect data for comparison across projects and future estimates. Since the Department's previous cost estimating guidance was significantly outdated, the Department is adopting the GAO *Cost Estimating and Assessment Guide* principles and best practices, especially the 12-step cost estimating process in its new guidance for developing project cost estimates and conducting ICEs. To the extent necessary, experienced and certified cost estimators/analysts from industry will be leveraged on an as needed basis to augment the Department's Federal staff in conduct of ICEs. The benefits of augmenting a small but dedicated pool of Federal staff with industry experts on an as needed basis reduces the cost of maintaining an excess pool of Federal cost estimators and cost engineers whose skill set is only required at specific phases of a project, and enables the Department to tap into experts who are well-versed in state-of- the-art cost estimating methods.

OVERHEAD RATES

Subcommittee. Mr. Secretary, each laboratory sets its overhead rates based upon its contract with the Department. However, within that there seems to be a great deal of flexibility for the contractor to change the amount and content of what is paid through overhead. Does the Department understand what is included in each lab's overhead rates?

Have you established consistency between the labs or at least a method by each can be compared against the others?

Secretary Chu. The Federal Acquisition Regulation and the Cost Accounting Standards (CAS) recognize each contractor's responsibility for overhead cost allocation. CAS requires each contractor to submit for contracting officer review and approval the practices to be used for allocating and charging costs under the contract. This is documented in a CAS Disclosure Statement. Each contactor's practices will differ depending on its financial systems and accounting, size, complexity and other factors. However, in an effort to improve the granularity and consistency of contractor overhead costs across the DOE-complex, an Institutional Cost Reporting process piloted in FY 2010 is being implemented in FY 2011. Reports generated as a consequence of the Institutional Cost Reporting process will be assessed at DOE-headquarters.

Subcommittee. Should all lab activities be subjected to the same rate? For instance, should large construction projects be taxed at the same rate as non-capital projects?

Secretary Chu. Cost allocation should be based on the operating environment which is different at each site. DOE does allow a lower rate for construction projects if it is warranted by the situation. For instance, construction projects at a remote section of a large site may not use all of the site services. In this case, a rate excluding services not available would be warranted.

Subcommittee. Aren't all costs for pensions included in overhead? If so, why is the DOE including funding in Weapons Activities and Nonproliferation to supplement overhead rates to meet the minimum statutory requirements? Are other agencies that do substantial work at DOE sites also requesting lump sums to pay their portion of pension costs?

Secretary Chu. The budget lines that reference pensions reflect NNSA's expected payment for legacy University of California pension plans. NNSA has a continuing obligation to reimburse the University of California Retirement Plan to fund retirement benefits for University of California (UC) retirees from Los Alamos and Lawrence Livermore National Laboratories. NNSA is unable to recover the costs associated with the liability to the UC through indirect cost pools as NNSA does for pension costs associated with benefit plans sponsored by current NNSA contractors. Other agencies are not providing "lump sum" payments for these plans, which are a legacy of past DOE work.

The amounts were determined based on expected contribution levels provided by the Regents of the University of California System actuarial report that is provided to the Department at the end of the plan year. Actual payment in the year of execution will be based upon actions by the State of California. The NNSA has historically made contributions when the State made a similar payment to its portion of the plan.

Subcommittee. Are there other costs which should be, but are not, captured in overhead rates in order to equitably share the costs of DOE infrastructure and personnel used by other agencies?

Secretary Chu. The Department reimburses contractors for some site operating expenses (including security and maintenance costs) using a combination of direct-appropriated funds and funds generated from indirect allocations to site customers, creating a complex cost accounting situation necessitating a separate cost allocation rate for non-DOE customers for these costs. The Department has issued guidance regarding the allocation and recovery of security costs to non-DOE customers but is currently studying whether additional guidance is needed regarding the recovery of site maintenance expenses at some sites. DOE applies a Federal Administrative Charge for recovery of the federal cost.

Subcommittee. For the record please provide the overhead rates for each lab, including a summary of what is included in the overhead rate and note any differences between the labs.

Secretary Chu. Rates between labs vary due to differing allocation procedures. For example, some sites charge a particular cost directly to programs, while other contractors charge it indirectly by allocating the cost to the site customers as overhead. Rates will be higher at sites charging indirectly, but total cost will remain the same. To make a valid comparison, total cost should be compared, not rates. Specific information on the overhead rates and the composition of those rates available are not yet readily available, because data from the Institutional Cost Reporting process is just now being collected. However, the Institutional Cost Reporting process, ,that is being implemented in FY 2011 will improve the granularity and consistency of contractor overhead costs. Reports generated as a consequence of the Institutional Cost Reporting process will be assessed at DOE-headquarters.

LABORATORY DIRECTED RESEARCH AND DEVELOPMENT

Subcommittee. Mr. Secretary, the labs have the authority to levy a "tax" of up to 8 percent of their DOE funding for lab-directed research and development. Besides the requirement to use this funding for activities related to the Department's mission, there's not a lot of further direction.

Does the Department have a policy to ensure that LDRD is not used for activities otherwise denied by Congress?

Secretary Chu. The Department has an LDRD policy that establishes requirements, roles, and responsibilities to ensure proper execution and oversight of the LDRD program and the prudent use of federal funds. DOE's policy specifically requires, among other things, that LDRD not be used to substitute for or increase funding for any tasks for which a specific limitation has been established by Congress or the Department. In addition, the designated local DOE offices (site offices) are responsible for reviewing and concurring on each LDRD project proposed for funding prior to the start of work to ensure the project meets this and all other LDRD program requirements prescribed in DOE policy.

Subcommittee. Is there a uniform approach to what each lab applies the tax to? For example, are construction projects or funding passed through to other agencies included?

Secretary Chu. Yes, there is a uniform approach. By statute and DOE policy, a laboratory's maximum allowable LDRD funding level is 8 percent of its annual operating and capital equipment budget. The system for accrual of these funds, to a reasonable extent, must provide for equitable pro rata contributions by all sources of operating and capital equipment funding. Conversely, funding for construction projects is not charged the LDRD assessment. Please note that the laboratories do not pass funding through to other agencies.

Subcommittee. For the record, provide the actual or effective rate of LDRD by lab and what portion of each lab's work is taxed.

Secretary Chu. Each year, and in response to the Conference Report (H.R. Report No. 106-988) accompanying the Fiscal Year (FY) 2001 Energy and Water Development Appropriations Act, the DOE Chief Financial

Officer develops and submits a financial accounting report of LDRD expenditures by laboratory to Congress. This report documents the amount spent on LDRD as a percentage of each DOE/NNSA laboratory's operating budget (i.e., actual rates of LDRD). The table below provides the actual LDRD rates by DOE laboratory for FY 2010. This table may also be found in the most recent report to Congress on LDRD, *FY 2010 Laboratory Directed Research and Development (LDRD) at the DOE National Laboratories*, which was delivered in January 2011. Please note that the answer Question 44-2 identifies what portion of a laboratory's work is assessed to LDRD.

FEDERAL PAY FREEZE

Subcommittee. Mr. Secretary, the Administration has imposed a pay freeze on federal workers, starting in the fiscal year 2012 budget.

How much is the fiscal year 2012 budget request reduced as a result of this pay freeze?

Secretary Chu. The pay freeze on federal employees reduced the fiscal year 2012 budget request by $57 million.

Subcommittee. Does your pay freeze include all political appointees?

Secretary Chu. Yes. The pay freeze includes all political appointees. However, Schedule C appointees do receive within grade increases (step increases) when eligible, but are not authorized to receive any other type of pay increase.

Subcommittee. Does your interpretation of the pay freeze include bonuses and incentives?

Secretary Chu. No. The pay freeze only includes adjustments to the annual basic and locality pay increases.

We are, however; carefully monitoring the use of awards to ensure they are not used as a workaround for the pay freeze. I have requested that all requests for special act awards for our career senior leaders be reviewed by a corporate board to make sure that they are consistent with policy, are well documented and are sparingly and judicious used to reward only the most outstanding performance. In addition, political appointees do not receive bonuses or incentives.

Table 1. FY 2010 Overall LDRD Costs and Rates by Laboratory

Laboratory	**LDRD Certified Costs ($M)**	**Total LDRD Certified Cost**	**LDRD as a % of Certified**

		Base ($M)[10]	**Cost Base (Rate)**
Argonne National Laboratory	28.5	629.3	4.53%
Brookhaven National Laboratory	11.3	485.9	2.33%
Idaho National Laboratory	28.6	1,059.8	2.70%
Lawrence Berkeley National Laboratory	20.6	686.6	3.00%
Lawrence Livermore National Laboratory	88.7	1,550.5	5.72%
Los Alamos National Laboratory	126.4	2,174.8	5.81%
National Renewable Energy Laboratory	7.3	299.3	2.44%
Oak Ridge National Laboratory	32.2	1,334.0	2.41%
Pacific Northwest National Laboratory	35.8	876.0	4.09%
Princeton Plasma Physics Laboratory	1.8	85.0	2.12%
Sandia National Laboratories	152.7	2,259.0	6.76%
Savannah River National Laboratory	4.0	132.8	3.01%
SLAC National Accelerator Laboratory	3.3	256.2	1.29%
Total	**541.2**	**11,829.2**	**4.58%**

---

[10] Recovery Act costs have been excluded from the total LDRD certified cost base.

NATIONAL LAB FOCUS

Subcommittee. Mr. Secretary, a couple of weeks ago members of this subcommittee visited DOE facilities and Los Alamos and Sandia – both of which are part of the "national security enterprise". We were there to learn about their work on nuclear weapons and other defense issues, but I noticed at both labs how much work they were doing on renewable energy. For instance, I couldn't count the number of photovoltaic testing facilities I saw just driving around. How do you, as Secretary, keep these labs focused on their national security mission?

Secretary Chu. The NNSA labs are part of the overall DOE national laboratories complex with the mission to ensure America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. Energy security is part of the national security mission. Pursuing alternative energies, such as renewable energy, is key to ensuring this nation's vitality in responding to energy needs. In FY 10, about 1% of LANL budget and 3% of Sandia budget were funded by the DOE Energy Efficiency and Renewable Energy office to conduct research and development activities supporting renewable energies. This allows our labs to continue addressing energy challenges while focusing on the overall national security mission.

Subcommittee. I was very impressed with the breadth of work that Sandia, especially, did for non-DOE agencies. Given that so much of this work around the DOE complex is for defense agencies, how is this work coordinated in such a way to ensure that costs are shared?

Secretary Chu. Our policies for non-DOE agencies provide these agencies the opportunity to utilize our complex-unique capabilities, and establish prices and charges for materials and services sold or provided to external organizations, other federal agencies, and the private sector. These services and materials are provided at full cost recovery by the DOE. Full cost includes all direct costs incurred in performing work, all allocable costs incurred by the department and its site/facility management contractors at any DOE/NNSA facility, and a Federal Administrative Charge of up to 3 percent of these costs, as authorized by Section 3137 of Public Law (P.L.) 105-261, National Defense Authorization Act for Fiscal Year 1999

Subcommittee. How do you ensure that the next major building, or piece of equipment, needed to support a non-DOE user is actually paid for by that user, and not DOE?

Secretary Chu. Our orders and policies define a set of criteria that must be met before accepting such tasks. Before any non-DOE construction, that exceeds the general plant project threshold at a DOE/NNSA site can begin, approvals must be granted by the cognizant DOE Secretarial Officer with concurrence of the DOE Chief Financial Officer for a DOE site (or the NNSA Associate Administrator for Management and Administration for an NNSA site with concurrence of Office of Field Financial Management for NNSA). The projects must comply with DOE program project management for the acquisition of capital assets; upon completion title for the permanent construction must vest in DOE/NNSA, and disposition of equipment must be as previously agreed or as instructed by the sponsor. Equipment shipping costs are the responsibilities of the sponsor.

ADDITIONAL QUESTIONS FROM CHAIRMAN FRELINGHUYSEN, OF NEW JERSEY

INCREASES FOR CLIMATE SCIENCE

Chairman Frelinghuysen. Mr. Secretary, some Science programs see significant increases in the budget request, while others are flat or cut below the current level. Climate and Environmental Sciences is one of those singled out for a large increase, at a requested $342 million, or 20 percent above the current level.

The President clearly stated the Administration's effort to strengthen American competitiveness by focusing budget increases on clean energy research and development. Why is the Climate and Environmental Sciences program, which is clearly not central to clean energy competitiveness, singled out for a substantial increase?

Secretary Chu. Understanding how and why the Earth's climate will change in the future as a result of changes in atmospheric, terrestrial, ocean, and cryospheric conditions is essential to making informed decisions about future energy technology development and deployment investments, management of natural resources, and national security vulnerabilities. Investments in the development of reliable modeling tools for informing multibillion to trillion dollar investments in energy infrastructures is directly related to our national clean energy competitiveness.

Until a decade ago, the energy sector assessed the design, deployment, and finance risk based on the environmental pressures associated with past and/or existing climate data, for a given local region. However, the climate research community had been unable to make predictions on the spatial scales of order 10–50 km that are necessary to provide risk information for energy sector planners. These model deficiencies had been attributed in most part to a lack of computer power and significant gaps in scientific understanding of important components of the climate system. A decade ago climate models were able to make projections but only on spatial scales of 150 km or higher.

The DOE Office of Science's preeminence in atmospheric measurement, process modeling, and high performance computing has provided the foundation for sophisticated models that in turn produced more confident statements on, for example, the number of heat wave days and frequency of extreme events in a future climate. The spatial resolution of these projections, however, is still too large at 100 to 150 km. There are also significant scientific gaps responsible for model uncertainty, most importantly our understanding of clouds, aerosols, ice sheets, and the Arctic in general.

The Office of Science's investments in its modeling activities, high performance computing, and targeted field measurements advance scientific understanding, validate more advanced versions of models, and address the most important gaps in model performance and capability. The increased funding for the Climate and Environmental Sciences recognizes that energy planners need reliable, robust modeling tools for assessing risks and informing major energy investment decisions, and they need them sooner rather than later. The FY 2012 budget request will invest in efforts to improve these modeling tools in a more aggressive manner, by advancing climate models more rapidly and provide improved information on future long-term weather patterns and extremes, with greater spatial resolution and confidence than is possible today.

Chairman Frelinghuysen. Mr. Secretary, why do you single out Climate and Environmental Sciences for an increase while other programs more closely linked to energy and American competitiveness—like Fusion Energy Sciences—see a reduction in funding?

Secretary Chu. Energy planners need reliable, robust modeling tools for assessing risks and informing major energy technology investment decisions. Climate modeling was limited during the past decade by both an insufficient understanding of the science (leading to unacceptably large climate projection uncertainty) and inadequate spatial model resolution (due to inadequate high performance computing capabilities). Some of these limitations will be overcome in the next five years, given recent and emerging high performance computing capabilities and the new data to be collected with DOE Office of Science (SC) facilities, which can be rapidly exploited by the DOE/SC climate modeling program. Our goal is to advance climate model resolution from its current capability at 100-150 km spatial resolution to 10-50 km resolution within the next 5 years. In addition, a science goal is to develop a sufficiently good understanding of the sciences to make future projections of redistributed patterns of wind, temperature, and precipitation fields, and provide confident projections of extreme events on decadal to centennial time scales. These goals together will allow climate model outputs to make significant contribution to energy system planners, who will be able to exploit the emerging clean energy technologies and design infrastructure systems for large scale deployment.

The FY 2012 budget request for Fusion Energy Sciences is designed to optimize scientific productivity of the program, providing the U.S. contributions to the ITER project and enabling a robust domestic research program for fusion and plasma sciences as well as leveraging international investments in unique facilities.

Chairman Frelinghuysen. This subcommittee has spent quite a bit of time looking at redundancies and duplicative programs across the Department of Energy and other federal agencies, and climate science strikes me as one of those areas worth inspecting. The National Oceanic and Atmospheric Administration, Environmental Protection Agency, National Science Foundation, NASA, and other federal agencies all perform various forms of climate science and analysis. Some of these agencies have missions specifically focused on climate and weather. Even if the Department of Energy has historically done some of this work, should it do this work, in light of the fact that climate science is not part of the Department's energy mission?

Secretary Chu. Climate science research is an extremely broad discipline where the U.S. has provided leadership, due in large part to the contributions of four different federal agencies that have integrated climate research programs: DOE, NSF, NASA, and NOAA. Each agency contributing to the national investments in climate science research does so with the goals of addressing their mission-specific agency needs, capitalizing on their core strengths and competencies, and leveraging the expertise and investments of other federal agencies. Climate science is an integral part of the DOE energy mission to assure energy security and economic prosperity. DOE emphasizes specific climate model priorities that will address the climate-induced vulnerabilities affecting present and future energy infrastructures. In response to this need, DOE established major climate research facilities, best-in-class computers at its national laboratories, and a broad science base in its laboratories and in academia.

Because the scale of the scientific challenge requires access to a broad talent pool, DOE has partnered with NSF on key scientific issues. Furthermore, DOE and NSF joined forces in developing the Community Earth System Model (CESM). All DOE national laboratories as well as the NSF's National Center for Atmospheric Research participate in advancing CESM capabilities and performance. DOE also supports the Program for Climate Diagnostics and Intercomparison (PCMDI), a Lawrence Livermore National Laboratory activity that continually diagnoses and provides intercomparisons of all 23 of the world's leading climate models. The DOE PCMDI activities provide guidance on science priorities that will have the greatest scientific and modeling return on investment. DOE investments, assets, and capabilities in climate research are unparalleled.

NOAA supports the Geophysical Fluid Dynamics Laboratory (GFDL) climate model and a major monitoring program, in large part through activities under the National Weather Service. NASA supports a third smaller climate modeling program, with a view towards improving and designing space-based monitoring technologies and future mission designs. NASA also carries out monitoring, that both NOAA and DOE researchers use to advance their respective model capabilities. NASA uses the DOE Atmospheric Radiation Measurement Climate Research Facility (ARM) data to help validate satellite remote sensing products. NSF and DOE partner in climate model development, and they play a critical role in advancing key scientific issues in the atmospheric, oceanic, and terrestrial sciences, of importance to the climate community.

There are no climate modeling and prediction programs at other federal agencies such as U.S. Department of Agriculture (USDA) or the Environmental Protection Agency (EPA). USDA and EPA use predictions from numerous climate models, including CESM, to drive adaptation and/or mitigation strategies. Issues addressed by these agencies include, impacts of climate change on agricultural systems, air pollution epidemiology, and spread of disease.

ADDITIONAL QUESTIONS FROM VICE CHAIRMAN WOMACK OF ARKANSAS

Vice Chairman Womack. Yesterday, in Harrison, Arkansas, gas prices were $3.83 per gallon. I noticed in the budget that the Administration plans to sell $500 million of Strategic Petroleum Reserve oil to provide for flexibility in managing the Reserve. When the United States is currently purchasing a barrel of oil from foreign sources for over $100, wouldn't this domestic oil help ease the pain currently felt at the pump?

Secretary Chu. We recognize the effects high oil prices can have on the global economic recovery, so we are monitoring the state of the market closely. We've taken a number of steps to address the impact of gas prices:

- We launched a task force led by the Attorney General to take on cases of fraud and manipulation in the markets that might try to take advantage of consumers at the pump, including any illegal activity by traders and speculators.

- We fought for a payroll tax holiday in December that has helped cushion to blow for consumers.

- And we're calling for the elimination tax breaks subsidizing the profits of the big oil and gas companies and redirect those funds to building a clean energy economy that creates jobs in the United States.

Vice Chairman Womack. Is our country able to make a significant enough profit off the sale to justify the exportation?

Secretary Chu. The crude oil sale from the Strategic Petroleum Reserve is being proposed for operational purposes and the crude oil will be sold for use in the United States. Some SPR caverns are overfilled and space is needed to perform casing inspections and cavern workovers.

Receipts from the sale will be deposited to the U.S. Treasury. The current average price paid for crude oil in the Strategic Petroleum Reserve is approximately $29.76 (excluding storage costs) . With market prices currently over $100 per barrel, and projected to remain above the current average price paid for SPR oil the Government will realize a profit from the sale.

Vice Chairman Womack. Through regulations and moratoria, the Department of the Interior and the EPA seem to have a heavy hand in the availability of domestic energy sources. What is the level of coordination between those two entities and the Department of Energy?

Secretary Chu. The Department of Energy (DOE) regularly interacts with EPA by providing technical assistance on a variety of topics. Historically, the Department has provided data from research programs to help develop proposed regulations. Examples of these interactions include the characterization and research of Activated Carbon Injection for Mercury removal to support the development of the Clean Air Mercury Rule. This research also supported the development of Flue Gas Desulphurization (FGD) systems to support implementation of the Clean Air Act as amended. Another example is the study of sub-surface geology to support the development of a new class of Underground Injection Control permits for geologic CO_2 storage.

DOE also collaborates with EPA and other agencies through the interagency review process lead by OMB, providing technical review of proposed regulations. These reviews are designed to strengthen the proposed rule, and provide a regulatory solution that is both stringent yet achievable.

DOE collaborates with the Department of the Interior (DOI) on their ongoing assessment of geologic reservoirs for carbon sequestration. In addition, DOE and DOI were two of the 14 agencies participating in the Interagency Task Force on Carbon Capture and Storage. As a part of the additional work identified by the Task Force, DOE and DOI, along with EPA, the Department of Justice, and the U.S. Treasury, are continuing to work to develop a set of further recommendations relating to long-term liability and stewardship associated with CCS.

Vice Chairman Womack. What is the plan to increase production when every time we turn around the EPA is stifling production?

Secretary Chu. In the United States, the production of coal is primarily a function of the electricity market demand. Coal-fired generation competes with natural gas and other generation technologies.
The Department of Energy does not have any technology programs focused on the improvement of coal production. Our primary focus is on the development of end-use power generation technologies.

Concerning oil and gas production, the President recently directed the Department of the Interior to evaluate potential changes to the leasing process that would encourage development such as new lease terms, rewards for rapid development, and region-specific strategies. The President also called for ways to encourage responsible development of natural gas, particularly shale gas, including research and recommended practices.

Much of the electricity in Arkansas is supplied by a nuclear plant. In light of the nuclear plant explosions and possible meltdown in Japan, can you speak to the safety initiatives currently in place at U.S. facilities to protect our citizens from exposure to radiation? Can you discuss what actions the Department will take to learn from any current or future problems in Japan to help make our nuclear reactors more secure?

Secretary Chu. Every U.S. nuclear plant is designed to withstand the specific hazards associated with its own site. These hazards include earthquakes, hurricanes, floods and tornados. In the aftermath of the accident at Three Mile Island, the government and industry made many changes to the design and operations of plants that have markedly increased the safety and reliability of the U.S. industry. Additionally, since the attacks of September 11, 2001, the Government and industry have emphasized the mitigation and prevention of external man-made threats. The bottom line is that U.S. plants are safe. However, as a result of the greater than anticipated earthquake and tsunami in Japan, the U.S. Nuclear Regulatory Commission has launched a systematic re-examination of the safety of U.S. nuclear plants. As directed by the Nuclear Regulatory Commission in a staff requirements memorandum dated March 23, 2011, NRC is launching a two-pronged review of U.S. nuclear power plant safety. There is a short-term assessment to determine whether or not any immediate NRC actions or orders are necessary, and a longer-term assessment to inform any necessary future changes to regulations. The short term assessment will report to the Commission in intervals of 30, 60 and 90 days. Thus far the Department of Energy has applied significant intellectual resources to understanding the situation in Japan. As we move forward we are developing new capabilities and improving existing ones for predicting the consequences of accidents in nuclear power plants. These capabilities are being made available to the NRC and to industry as required. Understanding the limits of plant performance in response to severe accidents is an important element in assessing the ultimate safety of the U.S. nuclear fleet.

Vice Chairman Womack. It is my understanding the Department of Energy is working with private industry on the research and certification side of the Small Modular Reactors. I also noticed that SMR support funding was included in the FY2012 budget. What are the current plans to move forward on this project and what is the expected timeline SMRs will be available for licensing and use by private entities?

Secretary Chu. The DOE Office of Nuclear Energy (NE) is preparing a funding opportunity announcement (FOA) for a LWR SMR Licensing Technical Support program that will be cost-shared with industry and provide engineering assistance for up to two light water reactor-based SMR designs. This program is intended to help accelerate the commercialization of relatively mature LWR-based small modular reactors. DOE believes industry could receive initial licenses for LWR SMRs and begin construction in the 2016 timeframe.

THURSDAY, MARCH 31, 2011.

DEPARTMENT OF ENERGY—NUCLEAR ENERGY AND NUCLEAR REGULATORY COMMISSION, FY 2012 BUDGET

WITNESSES

DR. PETER LYONS, ACTING ASSISTANT SECRETARY FOR NUCLEAR ENERGY

GREGORY JACZKO, CHAIRMAN, NUCLEAR REGULATORY COMMISSION

Mr. SIMPSON. Good morning, everyone. I would like to call this hearing to order. The Subcommittee on Energy and Water Development meets today to hear testimony on fiscal year 2012 budget requests for the Nuclear Regulatory Commission and for the Department of Energy's Nuclear Energy Applied Research and Development programs.

We have before us Gregory Jaczko, the Chairman of the Nuclear Regulatory Commission, and Pete Lyons, the Acting Assistant Secretary for Nuclear Energy at the Department of Energy. I welcome both of you and look forward to your testimony.

The last three weeks have been devastating for the people of Japan. Our thoughts and prayers are obviously with them. In addition to this terrible loss of life in Japan, this Subcommittee has been paying close attention to events at the affected Japanese nuclear power plants given our jurisdiction over nuclear energy appropriations. Our hearing today is very timely. We look to two of our witnesses to inform us both on the events in Japan and on any implications for us here at home.

Average U.S. electricity prices have gone up 45 percent in just the last ten years. With growing global demand for energy sources, promising to pinch American wallets even further in the coming decades, a diverse and domestic mix of energy sources is essential to our prosperity now more than ever. Nuclear energy currently generates 20 percent of America's electricity and powers much of our naval fleet. There is little doubt that it will be a significant portion of our energy mix moving forward. A new crop of next generation reactors is on the cusp of moving forward and will be an important part of that mix. And still, we cannot charge forward with new plants without ensuring the safety and security of this and future generations to Americans. We must learn all we can from what happened in Japan and make certain that our reactors, whether existing or new, are safe. Today we will consider programs of the Department of Energy and Nuclear Regulatory Commission that work to ensure the safety of our existing fleet of nuclear reactors. We will also consider how activities proposed in the 2012 budget request would develop new generations of nuclear power plants with designs that incorporate the latest technological advances for improved efficiency and safety. In all of these areas, Dr.

Lyons and Chairman Jaczko, we look forward—we look to you to give us the facts and to explain a path forward for learning from the events in Japan and building an energy independent and prosperous America.

Just as important, we will hold you both accountable to explain how the administration's position to shutter the Yucca Mountain waste repository, a position that throws away billions of dollars of investment and with it a plan to dispose of spent fuel spread across the country, furthers our energy interests and citizen safety. I ask that each of you please ensure that the hearing record, the questions for the record, and any supporting information requested by the Subcommittee are delivered in final form to the Subcommittee no later than four weeks from the time you receive them. Members who have additional questions for the record will have until the close of business tomorrow to provide them to the Subcommittee office. At this point I will turn to Mr. Pastor for any comments that he may have.

Mr. PASTOR. Good morning, Mr. Chairman, and thanks for taking the time today to discuss the NRC budget and activities in Japan. Mr. Lyons, good morning. It is good to see you again.

As the Chairman has said, this hearing is timely. With the recent events in Japan, it is important to understand what we know of the events in Japan and how it relates both to the operating nuclear plants in the United States and their planned expansion. Of course, the implications for the U.S. are not the primary concern at this point in time. The safety of the Japanese people and their recovery is of utmost importance in the short term. I would like to hear what we are doing to support our ally, and if there are any funding issues that must be addressed to ensure the United States is doing all it can to support Japan.

As we move forward with a review of current safety requirements, the events in Japan have highlighted the importance of this position path for spent fuel. A number of U.S. plants are approaching three times the amount of spent fuel as originally planned. While the NRC has stated that spent fuel can be safely stored for longer than originally anticipated, it is still the critical issue. The administration's termination of Yucca has created a great deal of uncertainty when it comes to how the nation will dispose of its nuclear waste. Your organization, Mr. Lyons, would be responsible for executing the Department's responsibility under the Nuclear Waste Policy Act and informing the Blue Ribbon Commission that we will be looking at alternatives for the backend of the nuclear fuel cycle. The Subcommittee continues to have questions regarding how your organization will support the termination process and the path forward. And, Mr. Chairman, I thank you for the time, and I yield back.

Mr. SIMPSON. Mr. Lyons, welcome.

Mr. LYONS. Thank you. Mr. Simpson, Mr. Pastor, members of the Subcommittee, thank you very much for the opportunity to appear before you today to discuss the President's fiscal year 2012 budget request for the Office of Nuclear Energy at the Department of Energy.

As I testify here today and as you have noted in your opening comments, we should all be mindful of the people in Japan who are still dealing with the effects of a devastating earthquake and a tsunami. The damaged reactors at Fukushima represent the largest nuclear crisis the world has seen in nearly a quarter century. Efforts are ongoing to contain the nuclear material and mitigate the effects of the crisis. But there is no doubt that for many years the nuclear community will be studying the combined effects of the earthquake and the tsunami on the Fukushima reactors to determine if further safety upgrades are required.

During the crisis, the Office of Nuclear Energy has provided continual staffing to the Department of Energy's Emergency Operations Center to help interpret technical and environmental data arriving from the field. Our principal laboratory, the Idaho National Laboratory, has activated a technical response team that is coordinating six national labs to supply any required expertise.

Turning to domestic matters, President Obama has declared that now is "our generation's Sputnik moment" and that we will make investments in clean energy technology and as he said, "An investment that will strengthen our security, protect our planet, and create countless new jobs for our people." The President also called for a clean energy standard under which clean energy sources would provide the United States with 80 percent of its electricity by 2035. That is an ambitious goal and that will require all the sources of clean energy, solar, wind, and other renewables, as well as carbon capture and sequestration, and nuclear power. Such a standard will provide additional market pull to encourage private investment in new nuclear reactors.

The President's FY12 budget request supports nuclear power by requesting an additional $36 billion in loan guarantee authority for new nuclear plant construction. In addition, the budget request includes a total of $853 million for the Office of Nuclear Energy and over half of that budget, about $447 million, is for research, development, and demonstration.

One particular area that I would like to highlight now from our FY12 request is our proposed Small Modular Reactor or SMR program. I think that SMRs represent a tremendous opportunity for the United States to regain leadership in one potentially key area of the nuclear supply chain. They offer many potential advantages, including their highly passive safety systems. As other examples of advantages, building reactors in a factory setting and shipping them to a plant site could offer potential cost savings. If they can be air cooled, they would lessen regulatory and siting challenges. And if they can replace similarly sized fossil plant units, some of the needed infrastructure could already be in place. There are many other potential advantages, too, that we may explore with your questions.

To help accelerate the availability of SMRs, we have proposed a near-term, multi-year program focused on cost sharing for first-of-a-kind engineering associated with design certification and licensing. If that request is supported, we plan to promulgate a funding opportunity announcement that would initiate a competition to select two vendor utility teams. This, we believe, will spur innovation and help American companies compete internationally.

The President also mentioned our nuclear energy hub in the State of the Union address. Last May, we announced the winning team for that hub, and this May we will have the ribbon-cutting ceremony planned for the opening of the one-roof collaboration site at Oak Ridge National Laboratory as well as some first results from that hub, all available to the public. We remain extremely excited about the prospects of the hub for improving nuclear plant safety and efficiency through advanced computing capabilities.

I am making no attempt to cover all our programs in detail in this opening statement, and I will look forward to your questions to explore them in greater detail. Thank you.

Statement of Peter Lyons
Acting Assistant Secretary for Nuclear Energy
U.S. Department of Energy
Before the
Subcommittee on Energy and Water Development, and Related Agencies
Committee on Appropriations
U.S. House of Representatives

FY 2012 Appropriations Hearing
March 31, 2011

Chairman Rogers, Chairman Frelinghuysen, Ranking Member Dicks, Ranking Member Visclosky, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the President's fiscal year (FY) 2012 budget request for the Office of Nuclear Energy at the Department of Energy.

As I testify before you today, I know we are all still mindful of the people in Japan who are still dealing with the effects of a devastating earthquake and tsunami. Those who have lost their lives and the survivors are in our prayers. The damaged reactors at Fukushima represent the biggest nuclear incident the world has seen in nearly a quarter century. Efforts are ongoing to contain the nuclear material and mitigate the effects of the crisis, but there is no doubt that for many years the nuclear community will be studying the combined effects of the earthquake and tsunami on the Fukushima reactors to determine if further safety upgrades are required.

During the crisis, the Office of Nuclear Energy provided continual support to the DOE emergency operations center to help interpret technical and environmental data arriving from the field. Our principal laboratory, Idaho National Laboratory, stood up a technical response team that is coordinating six national labs to supply required expertise.

Turning to domestic matters, President Obama has called for a clean energy standard, under which clean energy sources would provide the United States with 80 percent of its electricity by 2035. It's an ambitious goal that will require all sources of clean energy: solar, wind, and other renewable technologies, as well as carbon capture and sequestration facilities and nuclear power. Investments in clean energy technology will strengthen our security, protect our planet, and create countless new jobs for our people. Such a standard will also provide additional market pull to encourage private investment in new nuclear reactors.

The President's FY 2012 budget request supports nuclear power by requesting up to $36 billion in additional loan guarantee authority for new nuclear power plant construction. In addition, the budget request includes $852.5 million for the Office of Nuclear Energy, a decrease of 0.6 percent from the FY 2010 current appropriation.

One particular area I want to highlight from our 2012 request is our proposed Small Modular Reactor (SMR) program. I think SMRs represent a tremendous opportunity for the United States to regain leadership in the nuclear realm. They offer many potential advantages. For example, building reactors in a factory setting and shipping them to a plant site could offer cost savings; if they can be air-cooled, that would lessen regulatory and siting challenges; and if they can replace similarly-sized fossil fuel plants, some of the needed infrastructure would already be in place. There are other potential advantages, as well.

To help accelerate the availability of SMRs, we have proposed a near-term, five-year program focused on cost-sharing for first-of-a-kind engineering support for design certification and licensing activities. If the request is supported, we plan to promulgate a funding opportunity announcement that would initiate a competition to select two vendor/utility teams. This will spur innovation and help American companies to compete internationally.

The President also mentioned our nuclear energy Hub in his State of the Union address. Last May, we announced the winning team for the Hub, and this May we will have a ribbon-cutting planned for the opening of the new one-roof collaboration site at Oak Ridge National Laboratory (ORNL), as well as first results for the public. We remain extremely excited about the prospects for improving nuclear power plant efficiency with advanced computing capabilities.

I have not covered all of our programs in detail, but I would be pleased to take any questions now. Thank you.

OFFICE OF NUCLEAR ENERGY (NE) PROGRAMS

LWR SMR Licensing Technical Support

The Light Water Reactor (LWR) SMR Licensing Technical Support program will focus on engineering support for LWR SMR licensing to help improve the timeline for the commercialization and deployment of these relatively mature technologies. These SMRs may help to improve the affordability of nuclear power because of the potential to reduce costs of licensing and constructing one or multiple units, ultimately making nuclear more appealing to owners and investors. Other key benefits could include:

- Improving cost, schedule and quality through the modularization of components by replication in a factory setting.
- Providing power for applications where large plants are not needed or where infrastructure to support a large reactor unit is lacking.
- Providing a carbon-free option for repowering aging fossil power plants or process heat for industrial applications.
- Providing potential nonproliferation benefits to the U.S. and the wider international community.

One additional benefit of the program may be the reestablishment of the U.S. as a technological leader in an emerging international market, leveling the playing field with growing foreign competition.

Reactor Concepts Research, Development and Demonstration

The mission of the Reactor Concepts Research, Development and Demonstration (RD&D) program is to develop new and advanced reactor designs and technologies that advance the state of reactor technology and broaden its applicability, improve its affordability and competitiveness, and ensure its lasting contribution to meeting our nation's energy and environmental challenges.

Small Modular Reactors Advanced Concepts R&D

The SMR Advanced Concepts R&D program would support laboratory and university and industry projects to conduct nuclear technology R&D, including the development of codes and standards, novel sensors, control systems for multiple units, probabilistic risk assessments, advanced SMR concepts, and other technologies that are unique and would be useful to support development of advanced SMR concepts for use in the mid-to long-term.

Next Generation Nuclear Plant

This program sponsors a collaborative effort with universities, industry, and the NRC to conduct the design, licensing, and R&D necessary to demonstrate a new generation of gas-cooled reactors in the United States.

In FY 2010, the Department engaged with industry to initiate a cost-shared conceptual design for the NGNP, which was completed at the end of 2010. The Nuclear Energy Advisory Committee commenced review of the conceptual design reports along with the state of NGNP R&D and licensing activities and plans to make a recommendation on whether or not to proceed into Phase 2 of the project during the third quarter of FY 2011. The Secretary will make a decision about the future of this project during the fourth quarter of FY 2011. The Secretarial decision will consider technical, financial, performance, and other issues in determining the appropriate next steps, including whether to proceed further on the project. The FY 2012 request for this program supports continued critical path R&D activities and work with industry.

Light Water Reactor Sustainability

This program will conduct R&D to explore extending the operating lifetime of current plants beyond 60 years and, where possible, enable further improvement in their productivity. The program will partner with industry and work with the NRC to conduct the long-term research needed to inform major component refurbishment and replacement strategies, performance enhancements, and plant license extensions. The research will focus on aging phenomena and issues that require long-term research that affect the existing fleet of both boiling and pressurized water reactors. Because industry has a significant financial incentive to extend the life of existing plants, the Department will work to ensure that activities are cost-shared to the maximum degree possible.

Advanced Reactor Concepts

This program was previously referred to as the Gen IV R&D program. It will continue the Gen IV R&D work but has been modified to encompass reactor technologies beyond Generation IV. The program will focus on reactors that could dramatically improve performance in sustainability, safety, economics, security, and proliferation resistance. This work includes scientific R&D at national laboratories and universities, as well as through collaboration with international partners.

Both advanced thermal and fast reactor systems will be considered within the ARC program. Fast reactors could be employed to consume long-lived, high-activity elements found in used LWR fuels as part of a long term waste management approach if economic, technical, safety, and proliferation challenges are addressed.

Nuclear Energy Enabling Technologies

The mission of the Nuclear Energy Enabling Technologies (NEET) program is to conduct research and development and provide crosscutting technologies that directly support and enable NE's broad portfolio. In addition, it will encourage the development of transformative, outside-the-box innovations in nuclear energy science and engineering.

Crosscutting Technology Development

Crosscutting Technology Development provides either crosscutting or enabling technologies to support multiple reactor concepts in the areas including reactor materials, advanced methods for manufacturing, new sensor technologies for monitoring material and equipment conditions in existing reactors, creative approaches to further reduce proliferation risks, and advanced modeling and simulation tools.

Transformative Nuclear Concepts Research and Development

This program supports, via an open, competitive solicitation process, investigator-initiated transformative projects that are high-risk, high-reward concepts with the potential for making significant leaps forward in advanced nuclear technology development. The primary goal of this program is to encourage the identification and development of innovative options in all aspects of the civilian nuclear energy program; ensuring that good ideas have sufficient outlet for exploration. The scope covers the full range of nuclear energy technology and is not specific to any on-going mission activities. However, information and results obtained through this program will be used to inform planning decisions in ongoing NE R&D programs.

Energy Innovation Hub for Modeling and Simulation

The Hub is creating a virtual reactor model of actual Tennessee Valley Authority-owned, Westinghouse-designed, operating pressurized water reactors (PWRs) that will be able to simulate reactor behavior. Engineers will be able to use this virtual model to improve the economics and safety of reactor operations by simulating proposed solutions to reactor power production increases and reactor life and license extensions. The combination of data gained from the virtual model and the physical reactor will be used to resolve technology issues confronting nuclear energy development. The Hub will also serve to educate today's reactor engineers in the use of advanced modeling and simulation through direct engagement in Hub activities. ORNL is leading a consortium (CASL – Consortium for Advanced Simulation of Light Water Reactors) of national labs, universities, and industry partners to manage Hub execution. CASL began operations in late June 2010. In FY 2010, the Hub was funded under the Generation IV budget line.

National Science User Facility (NSUF)

NSUF promotes the use of unique nuclear research facilities for science-based experiments to encourage active university, industry, and laboratory collaboration in relevant nuclear scientific research. The NSUF provides a mechanism for research organizations to collaborate, conduct experiments, and conduct post-experiment analysis at facilities not normally accessible. In this manner, researchers are introduced to new techniques, equipment, and personnel such that their research benefits from new technologies and experimental capabilities. The Idaho National Laboratory (INL) Advanced Test Reactor (ATR) and post-irradiation examination facilities of the Materials and Fuels Complex are available as user facilities. In addition, research reactors at the MIT and North Carolina State University and examination facilities at the Universities of Wisconsin, Michigan and Nevada-Las Vegas are partnered with the NSUF bringing additional user facilities to the research community.

Fuel Cycle Research and Development

The mission of the Fuel Cycle Research and Development (R&D) program is to implement R&D to help achieve the objective to develop sustainable fuel cycles as described in the *Nuclear Energy Research and Development Roadmap* (Roadmap). Specifically, the program will research and develop a suite of technology options that will enable future decision-makers to make informed decisions about how best to manage nuclear waste and used fuel from reactors. A long-term, science-based approach is employed to foster innovative, transformational technology solutions to achieve the mission.

The program also supports the other objectives described in the Roadmap regarding current reactors, new reactors, and minimizing the risk of nuclear proliferation and terrorism.

International Nuclear Energy Cooperation

International Nuclear Energy Cooperation (INEC) serves as overall lead for all NE international activities, including effectively coordinating international cooperative research and development activities; leading international nuclear energy collaboration efforts through bilateral and multilateral forums; providing technical, policy, and administrative support; and leading international nuclear fuel service discussions and other related activities.

Radiological Facilities Management

The Radiological Facilities Management (RFM) program maintains NE-managed nuclear facilities at the INL and provides support to nuclear and associated support facilities at ORNL and Los Alamos National Laboratory (LANL). Facilities related to the manufacture of radioisotope power systems for national security and space exploration missions are supported through the Space and Defense Infrastructure subprogram. DOE and the National Aeronautics and Space Administration (NASA) will initiate a project to restart the production of plutonium-238 (Pu-238) for future NASA missions and potential national security applications. NE's Research Reactor Infrastructure subprogram will continue to provide fresh reactor fuel services to operating university reactors that support nuclear energy R&D.

Idaho Facilities Management

The mission of the Idaho Facilities Management (IFM) program is to manage the planning, acquisition, operation, maintenance, and disposition of nuclear facilities and resources at the INL. The IFM program maintains DOE mission-supporting facilities and resources at INL in a safe, compliant status to support the Department's nuclear energy research, testing of naval reactor fuels and reactor core components, and range of national security technology programs that support the National Nuclear Security Administration (NNSA) and other Federal agencies such as the Department of Homeland Security in the areas of critical infrastructure protection and nuclear nonproliferation.

University Programs

NE designates up to 20 percent of funds appropriated to its R&D programs for work to be performed at university and research institutions, through open, competitive solicitations for investigator-led projects. The past two years, the university programs have awarded more than $110 million in competitive awards to support innovative research, infrastructure grants, and scholarships and fellowships.

Program Direction

Program Direction provides the Federal staffing resources and associated costs required to provide overall direction and execution of the Office of Nuclear Energy. Also included is funding for NE and General Counsel federal personnel responsible for oversight of Nuclear Waste Policy Act activities, including litigation involving the termination of the Yucca Mountain Nuclear Waste Repository, legal issues related to the standard contract with utility companies, administration of the Nuclear Waste Fund, and the Department's responsibilities regarding spent fuel and high level waste.

In addition to appropriated funds, NE also manages approximately $91 million dollars annually in work for others and reimbursable funding from NASA and the Department of Defense for the development of advanced radioisotope power systems for space exploration and national security missions.

Mr. SIMPSON. Thank you, Dr. Lyons. Chairman Jaczko.

Mr. JACZKO. Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you today to discuss the fiscal year 2012 budget request for the U.S. Nuclear Regulatory Commission. But before I speak about broader agency or budget matters, I would like to take just a few moments to address the tragic events in Japan. I would like to reiterate my condolences to all those who have been affected by the earthquake, tsunami, and the resulting nuclear emergency in Japan. Our hearts go out to all those who have been dealing with the aftermath of these natural disasters. The NRC has been working since the event started to support the U.S. Embassy in Japan as well as our colleagues in Japan with requests for information and analysis to help support their efforts to deal with this situation. In spite of the evolving situation, the long hours, and the intensity of the efforts, the NRC staff has approached their responsibilities with dedication, determination, and professionalism. And at the same time, we have still remained focused on our essential safety and security mission here with the reactors and other materials we regulate in the United States. I am very proud of the work that they have done.

On Monday, March 21, my fellow commissioners and I established a senior-level task force to conduct a comprehensive review of our processes and regulations to determine whether the agency should make improvements to our regulatory system. This review will be conducted in a short-term and a longer term timeframe, and we anticipate the first short-term review to be completed within approximately 90 days. And that review will involve meetings with the Commission at 30 and 60 days as well. The longer term review is scheduled to be completed in approximately six months from the beginning of its evaluation.

I would now like to turn back to a general description of our budget request for fiscal year 2012. As you know, the NRC currently licenses, inspects, and assesses the performance of 104 operating nuclear power plants as well as many fuel-cycle facilities and research and test reactors. Furthermore, we regulate nuclear materials that are in use at thousands of hospitals, universities, and other locations around the country. The safety and security of these facilities and materials is and always will be our number one priority. In light of the prevailing budgetary climate, the NRC is taking steps to improve our strategic planning and annual performance plans, the implementation of our contracting initiatives, and the efficiency and cost effectiveness of our corporate support functions. These initiatives allow us to fully meet our safety and security responsibilities while also reviewing new reactor applications and applications to construct and operate fuel-cycle facilities.

With these efforts as a backdrop, the agency has formulated its 2012 budget to support the NRC safety and security strategic goals and objectives.

Now I will just give you a few highlights overall of what the budget covers. Our proposed budget for the fiscal year 2012 is $1 billion, $28 million. That is a decrease of approximately $28 million from the fiscal year 2010 enacted level. Approximately 90 percent of that budget is recovered from fees on licensees, and this results in a net budget authority of approximately $128 million for fiscal year 2012, and this is a decrease of approximately $26 million from fiscal year 2010.

Of the $1 billion, $28 million requested, approximately $800 million of that goes to the Reactor Safety program, and this is a decrease of approximately $8 million from the fiscal year 2010 enacted level. Those decreases largely reflect fact-of-life changes in programs that are completing activity in our research area as well as just the natural changes in cycles with our License Renewal program. Our Materials and Waste Safety program budget decreases by approximately $20.7 million from the fiscal year 2010 level, and that is largely a reflection of the closeout of the high-level waste activities.

So with that broad overview, I will end my testimony and be happy to answer any questions you may have about specific programs for our fiscal year 2012 budget.

[The information follows:]

STATEMENT

BY GREGORY B. JACZKO, CHAIRMAN
UNITED STATES NUCLEAR REGULATORY COMMISSION
TO THE
HOUSE COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEE ON ENERGY AND WATER
MARCH 31, 2011

Mr. Chairman, Ranking Member, and Members of the Subcommittee, I am honored to appear before you today to discuss the Fiscal Year (FY) 2012 budget request for the U. S. Nuclear Regulatory Commission (NRC) and to respond to any questions that you may have. Since this session of Congress began, I've had an opportunity to meet with a number of you and your staff. I appreciate these conversations and your interest in the NRC's work. I look forward to working with all of you.

The NRC is an independent Federal agency established to license and regulate the Nation's civilian use of byproduct, source, and special nuclear materials to ensure adequate protection of public health and safety, promote the common defense and security, and protect the environment. Our critical mission entails broad responsibilities for the agency. The NRC currently licenses, inspects, and assesses the performance of 104 operating nuclear power plants, as well as many fuel cycle facilities and research and test reactors. Furthermore, nuclear materials are in use at thousands of hospitals, universities, and other locations around the country. Each of these facilities and materials users presents different challenges for the NRC and requires that the NRC develop and sustain a diverse array of regulatory capabilities. The safety and security of these facilities and materials is, and always will be, our number one priority.

The NRC's safety goal is to ensure adequate protection of public health and safety and the environment. The agency's safety program objectives are to prevent the occurrence of any nuclear reactor accidents, inadvertent criticality events, acute radiation exposures resulting in fatalities, significant releases of radioactive materials and significant adverse environmental impacts. Our security goal is to ensure adequate protection in the secure use and management of radioactive materials. The security program objective is to prevent any instances in which licensed radioactive materials are used in a hostile manner in the United States.

The NRC can be proud of its strong track record and our recognition by the international community as a leader in regulating the nuclear industry. The Commission cannot give enough credit for the NRC's effectiveness as a regulator to the NRC's diverse, hard-working, talented, and dedicated staff. The Commission is continually impressed by their expertise, experience, diversity, and commitment to public service.

It is important that the NRC maintain our commitment to continuous improvement. That has long been a defining value of the NRC and a key to our success in meeting our important safety mission. We have a responsibility to the public to always try to do better – whether by planning and prioritizing to allow for more timely implementation of agency actions by licensees, or by communicating more effectively to better engage stakeholders in agency decisions.

We also, however, have an additional imperative, in light of the prevailing budgetary climate and the strong desire by many to see federal agencies do more with less. No matter the outcomes of these current budget decisions, the agency must continue focusing on the critical task of how to make the most efficient use of our funds. The NRC must ensure that we are in the strongest possible position to efficiently and effectively use our financial resources to meet our mission.

In this area, as in many others, good process is the key to good outcomes. In accordance with the GPRA Modernization Act of 2010, the NRC is taking steps to improve our strategic planning and annual performance plans in order to achieve greater alignment of goals and performance across the agency. As part of the NRC's efforts to build a Strategic Acquisition Program, we are taking steps to ensure agency contracting initiatives are implemented in a more timely and efficient manner. We have resources dedicated to other business process improvements including the Transforming Assets into Business Solutions (TABS), a task force focused on identifying the most efficient, effective, and cost-conscious manner for the NRC to accomplish its corporate support functions.

These initiatives allow us to fully meet our safety and security responsibilities while also effectively reviewing applications associated with a renewed interest in the construction of new nuclear power plants and applications to construct and operate facilities that are part of the nuclear fuel cycle. The NRC is actively reviewing 12 combined applications to construct and operate new nuclear power reactors. Five different reactor designs are referenced in these applications; the NRC is currently reviewing the design applications for certification. If these design certifications are approved, they will be available to be referenced in future COL applications, and thereby make those reviews more straightforward. The NRC is also performing safety, security, and environmental reviews of facility applications, a uranium deconversion facility application, and applications for new uranium recovery facilities.

With these efforts as a backdrop, the agency has formulated its FY 2012 budget to support the agency's Safety and Security strategic goals and objectives.

Specifics of the FY 2012 Budget Request

The NRC's FY 2012 budget request is organized by business lines within our two program areas: (1) Nuclear Reactor Safety, and (2) Nuclear Materials and Waste Safety Programs. The NRC's proposed FY 2012 budget for both programs is $1,038.1 million, including 3,981.0 full-time equivalents (FTE), which represents a decrease of $28.7 million, including an increase of 0.8 FTE, when compared to the FY 2010 funding levels. The funding levels reflected above also support the Office of the Inspector General (OIG). The OIG FY 2012 proposed budget of $10.9 million includes resources to carry out the Inspector General's mission to independently and objectively conduct audits and investigations to ensure the efficiency and integrity of NRC programs and operations and to promote cost-effective management.

Pursuant to the provisions of the Energy Policy Act of 2005, the NRC's FY 2012 budget provides for 90 percent fee recovery, less (1) appropriations from the Nuclear Waste Fund, (2) appropriations to implement Section 3166 of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (which pertain to waste incidental to reprocessing), and (3) appropriations to conduct generic homeland security activities. Accordingly, $909.5 million of the FY 2012 budget would be recovered from fees assessed to NRC licensees and applicants. This would result in a net appropriation of $128.6 million, which is a decrease of $26.1 million in net appropriations when compared to the FY 2010 funding levels.

Nuclear Reactor Safety Program

The Nuclear Reactor Safety Program encompasses NRC efforts to license, regulate, and oversee civilian nuclear power, research, and test reactors in a manner that adequately protects public health and safety and the environment. This program also provides high assurance of the physical security of facilities and protection against radiological sabotage. This program contributes to the NRC's Safety and Security goals through the activities of the Operating Reactors and New Reactors Business Lines, which regulate existing and new nuclear reactors to ensure their safe operation and physical security. Overall resources requested in the FY 2012 budget for the Nuclear Reactor Safety Program are $800.8 million, including 3,032.9 FTE. This funding level represents an overall funding decrease of $8.0 million, with an increase of 48.4 FTE when compared with FY 2010 funding levels.

Within this program, the Operating Reactors Business Line supports the licensing, oversight, rulemaking, research, international activities, generic homeland security, and event response associated with the safe and secure operation of 104 civilian nuclear power reactors and 31 research and test reactors. The FY 2012 budget request for operating reactors is $521.3 million, including 2,064.4 FTE. This represents an overall funding decrease of $20.5 million, including 26.3 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources would support include the following:

- conduct technical review for 950 licensing actions, including complex actions such as license amendment requests from power reactor licensees adopting the requirements for performance standards for fire protection, often referred to as National Fire Protection Association (NFPA) 805
- review extended power uprate requests for increasing electric generating capacity and one improved standard technical specification conversion
- conduct 13 active, high- and medium-priority rulemaking activities
- conduct critical research and test reactor project management functions pertaining to license renewal application efforts, and applications to produce medical isotopes
- continue reviews of 12 license renewal applications
- conduct inspection activities for the 104 operating nuclear power reactors, including the component design-basis inspections, fire protection inspections, and generic issues inspections (approximately 100 per year)
- continue the Resident Inspector Pipeline Initiative to maintain an experienced and stable onsite inspection presence of qualified resident inspectors at the 104 nuclear power reactors

- conduct domestic and international security reviews and support for screening approximately 3,000 national and international operational events, with detailed evaluation of approximately 200 of those events
- carry out cyber security evaluations, as well as 24 force-on-force security inspections to complete a 3-year cycle for inspecting power reactors
- evaluate licensee emergency preparedness during biennial exercises

The resources within the Operating Reactors Business Line reflect a decrease in license renewal activities because of schedule changes and the reduced number of applications that will be under review.

The New Reactors Business Line supports the licensing, oversight, rulemaking, research, international activities, and generic homeland security associated with the safe and secure development of new power reactors from design, site approval, and construction to operational status. The FY 2012 budget request for new reactors is $279.5 million, including 968.6 FTE. This represents an overall funding increase of $12.5 million, including 74.8 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources will support include the following:

- perform licensing and hearing support for 15 combined licenses, including two new combined license applications during FY 2012
- certify one design certification amendment, continue licensing reviews, rulemaking, or both on five applications and begin pre-application review on a new design
- review two early site permit applications and begin review of one new application expected in FY 2012
- develop and implement the construction inspection program
- oversee the four reactors expected to be under construction
- continue licensing and oversight activities for the construction of Watts Bar Unit 2
- conduct 15 domestic and international vendor inspections of component manufacturing quality
- conduct pre-application activities for two small modular reactor designs
- perform an acceptance review and initiate a design certification review for one small modular reactor
- continue the implementation of the Next Generation Nuclear Plant licensing strategy, which was developed in accordance with the Energy Policy Act of 2005

- continue to develop the regulatory framework that integrates the use of risk insights into the review process and support the resolution of key policy and safety issues associated with small modular reactors

The New Reactors Business Line shows an increase primarily driven by construction oversight of two new potential reactors under construction (for a total of five) and by development of the workforce to support inspection of up to an additional six reactors in future years. In addition, resources increase to support the review of new advanced reactor applications, increased pre-application interactions with prospective applicants, and funding for the one-time build-out of a new Headquarters office building.

Nuclear Materials and Waste Safety Program

The Nuclear Materials and Waste Safety Program encompasses the NRC's responsibility to license, regulate, and oversee nuclear materials and waste in a manner that adequately protects public health and safety and the environment. This program's goal is to verify the safety and security of materials and waste and protection against radiological sabotage, theft, or diversion of nuclear materials. Through this program, the NRC regulates uranium processing and fuel facilities; research and pilot facilities; nuclear materials users (medical, industrial, research, and academic); spent fuel storage; spent fuel storage casks and transportation packaging; decontamination and decommissioning of facilities; and low-level and high-level radioactive waste.

Overall resources requested in the FY 2012 budget for the Nuclear Materials and Waste Safety Program are $226.5 million, including 868.5 FTE. This funding level represents an overall funding decrease of $20.7 million, including 49.6 FTE, when compared with FY 2010 funding levels.

Within this program, the Fuel Facilities Business Line supports licensing, oversight, rulemaking, research, international activities, generic homeland security, and event response associated with the safe and secure operation of various fuel facilities, such as conversion, enrichment, and fuel fabrication facilities, and nuclear fuel research and pilot facilities. The FY 2012 budget request for fuel facilities is $55.2 million, including 226.5 FTE. This represents an overall funding increase of $0.6 million, including 18.2 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources would support include the following:

- licensing and oversight activities associated with fuel facilities and licensees with greater than critical mass quantities of special nuclear material
- operation and maintenance of the Nuclear Material Management and Safeguards System database and the Nuclear Materials Information Program
- emergency preparedness, security, and licensee performance reviews
- licensing, certification, inspection, oversight, environmental reviews, research, adjudicatory, enforcement, allegation, and other regulatory activities associated with new and operating fuel facilities, including uranium conversion and enrichment and fuel fabrication
- completion of mandatory hearings on the uranium enrichment license applications for the AREVA centrifuge and General Electric-Hitachi laser enrichment facilities
- licensing review of the International Isotopes depleted uranium deconversion facility
- oversight of construction activities at the proposed Mixed Oxide (MOX) Fuel Fabrication Facility and commencement of construction of the AREVA, General Electric-Hitachi, and International Isotopes facilities

The Fuel Facilities Business Line resources increase to account for the significant construction activities planned at the MOX facility; the commencement of construction at the AREVA centrifuge and General Electric-Hitachi laser enrichment facilities, and the International Isotopes depleted uranium deconversion facility; and to reflect staffing required at resident inspector offices. Resources also increase to support rulemaking activities regarding the potential licensing of reprocessing facilities. These increases are offset by the completion of the licensing and environmental reviews of the AREVA and General Electric-Hitachi license applications, as well as the completion of the licensing and environmental reviews for the International Isotopes depleted uranium deconversion facility application.

The Nuclear Materials Users Business Line supports the licensing, oversight, rulemaking, research, international activities, generic homeland security, event response, and State, Tribal, and Federal program activities associated with the safe and secure possession, processing, handling, and use of nuclear materials for the many and diverse uses of these materials. Resources also support the National Materials Program and the Agreement State activities. The FY 2012 budget request for nuclear materials users is $92.1 million, including 347.1 FTE. This represents an overall funding increase of $0.4 million, including 9.1 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources would support include the following:

- completion of 2,500 materials licensing actions and 1,000 routine health and safety inspections, including naturally occurring and accelerator-produced radioactive material and security inspections
- event evaluation, research, incident response, allegation, enforcement and investigations, and rulemaking activities to maintain the regulatory safety and security infrastructure needed to process and handle nuclear materials
- materials activities related to State, Tribal, and Federal programs, including oversight, technical assistance, regulatory development, and cooperative efforts
- operation of the National Source Tracking System, a secure, Web-based, nationalized central registry designed to enhance the accountability for radioactive sources
- development of the Integrated Source Management Portfolio, which consists of the National Source Tracking System, the Web-Based Licensing System, and the License Verification System
- reviews of 135–180 import/export of nuclear equipment and material license applications
- investigations into 45–55 allegations of materials-related wrongdoing

The Nuclear Materials Users Business Line resources increase slightly because of adjustments made within the business line to cover emergent activities. Overall, a slight increase resulted to address the workload associated with the implementation of the Integrated Source Management Portfolio major information technology system, which consists of the National Source Tracking System, the Web-Based Licensing System, and the License Verification System.

The Spent Fuel Storage and Transportation Business Line supports the licensing, oversight, rulemaking, research, event response, and international activities associated with the safe and secure storage of spent nuclear fuel and safe and secure transportation of radioactive materials. The FY 2012 budget request for spent fuel storage and transportation is $41.2 million, including 152.4 FTE. This represents an overall funding increase of $7.4 million, including 29.7 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources would support include the following:

- review of license requests for site-specific independent spent fuel storage installations (ISFSIs), dual-purpose (storage and transport) casks, transportation security plans, and route approvals to support safe and secure domestic and international transportation of radioactive materials, regulatory requirements for full-core offload capability at operating reactor sites, and transfer of spent fuel to ISFSIs to support reactor decommissioning
- regulatory improvements to the proficiency and effectiveness of the licensing, inspection, and enforcement programs associated with storage and transportation of spent nuclear fuel
- inspection of storage cask and transportation package vendors, fabricators, and designers to ensure safety
- resolution of technical issues associated with allowance of burn-up credit for transportation and storage casks and the transportation and storage of high burn-up fuels (greater than 45 gigawatt-days/ metric tons of uranium)
- interaction with the International Atomic Energy Agency and other international regulators to inform the development of the regulatory framework for transportation of radioactive materials, long-term spent fuel and high-level waste storage, deferred transportation, and ultimate geologic disposal

The Spent Fuel Storage and Transportation Business Line resources would increase to develop the information necessary to evaluate extended long-term storage of radioactive material. Resources are provided for a risk-informing gap study to identify methods, data, decision criteria, and regulatory actions that are needed to implement a regulatory framework for very long-term (more than 120 years) dry spent fuel storage that is enhanced by risk insights. Resources will also support a scoping study for a generic environmental impact statement for ensuring protection of the environment from such spent fuel storage. Resources will also be provided to conduct research on technical issues associated with this storage, and to coordinate with international partners on options for harmonizing international standards for certification of transport packages and licensing of storage cask designs.

The Decommissioning and Low-Level Waste Business Line supports the licensing, oversight, rulemaking, research, and international activities associated with the safe and secure removal of a nuclear facility from service and reduction of residual radioactivity to a level that permits release of the property and termination of the NRC license. The FY 2012 budget request for decommissioning and low-level waste is $37.9 million, including 142.6 FTE. This represents an overall funding decrease of $0.3 million, including 7.6 FTE, when compared with FY 2010 funding levels. Examples of activities that the requested resources would support include the following:

- project management and technical reviews for decommissioning activities for 10 power reactors, 10 decommissioning research and test reactors, 24 decommissioning materials facilities, 21 inactive Title I decommissioning, 11 Title II decommissioning, uranium recovery facilities, and five sites that are under general license with the U.S. Department of Energy (DOE)
- interfaces with licensees, applicants, Federal and State agencies, the public, other stakeholders, and Native American Tribal governments
- 8 environmental reviews and 11 safety reviews (hearings included) in support of licensing and oversight of uranium recovery facilities
- oversight of certain DOE waste determination activities and plans for waste incidental to reprocessing consistent with the NRC's responsibilities in the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005

The Decommissioning and Low-Level Waste Business Line resources decrease reflects a refocusing of long-term waste research activities and adjustments made to the contract, travel, and training needs and other carryover balances for waste incidental to reprocessing work.

The High-Level Waste Repository Business Line supports activities associated with DOE's Yucca Mountain geologic repository application. This activity terminates in FY 2011. No resources are requested in FY 2012 for this business line.

In the FY 2012 budget structure, the New Fuel Facilities and Operating Fuel Facilities Business Lines were merged into the Fuel Facilities Business Line.

Mr. Chairman, Ranking Member, and Members of the Subcommittees, this concludes my formal testimony on the NRC's FY 2012 budget request. On behalf of the Commission, thank you for the opportunity to appear before you. I look forward to continuing to work with you to advance the NRC's important safety mission. I would be pleased to respond to any questions that you may have. Thank you.

Mr. SIMPSON. Thank you, and thank you both again for being here today. Everybody has mentioned the tragedy that has gone on in Japan with the earthquake and the tsunami and the resulting nuclear crisis, if you want to call it that. Could you give us, the Committee, a brief overview of what has happened, what the current situation is as you understand it, and what the implications are, early as they may be, for the nuclear industry in the United States?

Mr. LYONS. Want me to start?

Mr. SIMPSON. Start.

Mr. LYONS. Well, as you are well aware, the earthquake and the resulting tsunami have devastated the Fukushima Daiichi Plant. At the time of the earthquake, there were three reactors operating. Those, to the best of our knowledge, they—those three—shut down successfully, but the resulting tsunami, again, based on what information we have, damaged the emergency diesel generators. We have been following the resulting sequence now for a large number of days. The situation remains where they need to restore cooling for those plants as well as the seven spent-fuel pools at the site. And within the Department of Energy, we have been providing whatever assistance we can both to understand—first to understand—the situation and then to offer assistance. There are substantial numbers of personnel, about 40, and large amounts of equipment, which are on site in Japan assisting now. The situation remains serious until long-term cooling can be reestablished. Between us we can go into far more detail if you wish.

Mr. SIMPSON. In your view, what is the implication for the nuclear industry in this country? Have you been able to assess what you think it might be?

Mr. LYONS. I believe the President was completely correct in asking the NRC to undertake a very careful evaluation of any lessons learned or implications from the situation in Japan as they might apply to U.S. plants. Until that review is completed by the NRC, I am certainly not aware of changes that are required at any of the U.S. plants, but again, Greg can speak more directly to that.

Mr. SIMPSON. But let me follow that up first. The NRC announced a review of all commercial nuclear power plants per the President's orders. Is the DOE doing the same type of thing and, specifically, is DOE taking similar steps such as seismic analysis of the Advanced Test Reactor in Idaho?

Mr. LYONS. Yes, sir, very much so. I will start by saying we believe the Advanced Test Reactor at Idaho, which is a workhorse for us and for naval reactors, is operating safely. However, the Department of Energy, in a prudent step, is asking each of the operators of any similar facilities within the Department of Energy to undertake similar evaluations such as the NRC is undertaking for the commercial plants, and that process is ongoing.

Mr. SIMPSON. Okay. Chairman Jaczko.

Mr. JACZKO. Well, I would just add a little bit to what Dr. Lyons said about the event. Largely the challenges we believe for the long term have resulted because of the lack of electric power to the site. And that is a situation we refer to as a station blackout event, namely you lose all of the electric power and the backup electric power systems. That is known, based on our understanding of reactors, to be a significant event, and we are seeing obviously the consequences of that in Japan. So that is something we will be looking at as part of our review. And as I mentioned in my opening remarks, that review is essentially a two-step process. We will begin with a 90-day, what we are calling a quick look review, which is really to get an assessment of whether there are any immediate actions that we would need to take with reactors in this country. The longer term review will begin when we have more detailed information about what really were the causes of the challenges in Japan. As Dr. Lyons indicated, right now we know that there was an earthquake followed by a tsunami which appears to have been an important contributor to the event. But until the situation has really stabilized, we will not really know exactly what were the most important factors as we go forward. So the review we are doing will take a look at the best available information we have right now and really do a quick look and make sure that there are not any immediate actions we need to take to ensure the continued safety of reactors in this country.

Mr. SIMPSON. Your budget was prepared and submitted before this event in Japan. Will the reviews that you are both undertaking require additional resources from the budget? Will there be a supplemental request or an amended budget that is submitted to address the increased workload that is going to occur because of this?

Mr. LYONS. I cannot speak to whether a supplemental will be requested or not. We have been asked by our Chief Financial Officer to catalog expenses or costs that we are incurring specifically in response to the crisis in Japan, and those costs are certainly mounting. As to whether there will be a need for a supplemental or whether there will be a direct impact on our budgets in FY12, I do not foresee that now, but it is very much an evolving situation.

Mr. JACZKO. I think it is a similar situation for us. In the short term for the current fiscal year, we would anticipate being able to recover the costs or cover the costs for our activities likely through a reprogramming request once we have a final fiscal year 2011 budget. For fiscal year 2012 and beyond, at this point we do not anticipate a significant additional need. We would likely incorporate the longer term activities into our normal safety review process and into our normal safety activities. Of course, these may get a higher level priority and displace some other lower priority work, but at this point we do not anticipate a significant need for additional resources in 2012.

Mr. SIMPSON. Let me ask—on a different subject in a different direction—Dr. Lyons, you mentioned in your testimony SMRs. I have been in Congress now—this is my thirteenth year. I think I have had three Presidents, four, maybe five—at least four—Secretaries of Energy. I do not know how many Under Secretaries since we made an Under Secretary position and so forth. We have gone through—I cannot remember what it was in 1998 when I first came and we went through the GNEP phase; then we went through the NGNP phase; now we are going to the Small Modular Reactor phase. What phase are we going to move into next? And this gets back to my question of how do we create a sustainable program that we know what we are going to fund and why we are doing it without changing every time we have a new Secretary? I am kind of between a rock and hard spot here in that I want a new Secretary and an administration to be able to put their footprint down of what they would like to do. But we are talking about programs that are sometimes 10-, 20-, 30-year programs and this Committee is—we have put in NGNP I think $526 million total so far, something like that, I cannot remember exactly how much. Now we are substantially reducing the funding for NGNP and we are moving to a different phase of the Small Modular Reactor, again a cost-share program, moving from one cost-share program to another cost-share program. Could you give me the logic of what we are doing, why we are doing it, why will this cost-share program be successful when the other cost-share program apparently has not been, and what are the problems we are running into moving NGNP along the road that I think we all thought it was going to go down?

Mr. LYONS. Mr. Simpson——

Mr. SIMPSON. Pretty broad question.

Mr. LYONS. No, that is a rather broad question. Let me at least take a few cracks at some of those key points. As far as trying to achieve stability and achieve a long-term vision, I am very proud of the Research and Development Roadmap that we have pulled together within the Office of Nuclear Energy, certainly with participation from national laboratories, industry, many different sources. Certainly, my view and my very earnest hope is that the R&D Roadmap can lay out or has successfully laid out a long-term path in the directions that are appropriate for the nation to undertake from a research, development, and deployment standpoint, on the broad area of nuclear power. I would also point to the Blue Ribbon Commission. I think that is an extremely important group, which has been constituted by the Secretary with a very, very broad charter to try to look at all that has been learned in decades now, since the Nuclear Waste Policy Act, and provide suggestions certainly within the government and I hope they will be reviewed within Congress on appropriate approaches for management of used fuel. I am very, very optimistic that the BRC, the Blue Ribbon Commission, will provide some very, very important guidance to the country as we look into the future and hopefully reach I guess what I might term as a sustainable approach to management of used fuel. At least in my mind, we certainly have not demonstrated that we have a sustainable approach at this point, and I am looking to the BRC to help create it.

As far as NGNP, that remains an important program for us. I continue to be very confident that there is a strong future, a strong need in the country for reactors that operate at very high temperatures. This is very much a transition year—well, this year and FY12 are very much a transition year for the NGNP program. Just a couple of the events that are ongoing now: Our Nuclear Energy Advisory Committee is, as we speak, reviewing the NGNP program. They will provide a report to us. That will be the basis of a recommendation for a Secretarial determination later in FY11 as to whether we move ahead with construction of NGNP. I believe that a key element in that decision will be decisions by industry for effective cost sharing. You asked or at least I think part of your question was why are we having difficulty with the cost sharing in general. Again a complicated issue, but I think at least part of the answer—and I do not think it is specific to nuclear power; I think it is specific to almost any of the various clean energy sources—is that we have a very low cost of natural gas at least at this instant in the country. We do not have a value on carbon. For utilities looking at short-term solutions to energy needs, natural gas is an extremely inviting target. If one looks at a longer term view, the importance of diversity, I hope that there will be interest from utilities in moving towards a number of clean energy sources. And programs such as we have within our office, such as the Loan Guarantee program within another office, I hope can help to move us in that direction.

I think I completed the story on NGNP, but the reason for the reduction—I did not talk about that—the reason for the reduction in FY12 is that no matter which way the Secretarial determination goes late in FY11, either to transition to a more research-focused program or to move ahead with a construction program, we view FY12 as being a year of transition into that program. The funding that we have requested in FY12 is sufficient to maintain the R&D emphases within the high-temperature gas reactor program that is the backbone of the NGNP. And then depending on that Secretarial decision we will determine where we move in FY13 and beyond. That is a long answer, sir, but that was a complicated question.

Mr. SIMPSON. If I could, I just want to follow up on just one question. If the Department was to accept the proposed cost share by industry, what would that do to the Department's Research and Development budget in terms of nuclear energy?

Mr. LYONS. It would basically consume it. The industry proposal such as I have seen—and, of course, that may evolve as we move further into this process—would require such a large fraction of the budget, assuming the current levels of budget within my office, it would be extraordinarily difficult for us to pursue any of the other essential activities that are required within my office.

Mr. SIMPSON. Thank you. Mr. Pastor.

Mr. PASTOR. As I recall, building this reactor is going to be at what cost, dollar wise?

Mr. LYONS. Well, those estimates are still being developed, but it is probably going to be——

Mr. PASTOR. Well, give me a ballpark.

Mr. LYONS. $3 to $4 billion range.

Mr. PASTOR. $3 to $4 billion, and so I think—as my conversations with the group have been, that probably 2011 at the latest we are either going to do it or we are not using the money effectively. I think that we are pretty much at the cusp of having to make that decision. If the money is not there, and this is probably this year, then we are going to have to let this program go because of the cost share and the unwillingness for industry to step up and bring forth that kind of money. Do you not agree?

Mr. LYONS. Well again, sir, the plan is late 2011 for the Secretarial determination. That Secretarial determination will certainly include evaluation of industry's interest and willingness for a cost share. If that is not forthcoming, my anticipation is that we will move to a research focus, which I believe should continue on high-temperature reactors in general.

Mr. PASTOR. Well, I would tell you that the probability that it is going to go forward with completing the reactor is—the chances are pretty minimal. But I was wrong in the brackets, so I guess I could be wrong on this one. But I have to tell you that after seeing this program now for a number of years and the willingness, I think, right now of the industry for a consortium to come up with that kind of money is not there for various reasons.

The other question I had was dealing with safety. I know that you are going to start the review shortly and it is going to be a 30- to 60-day review as I heard your testimony. Now you have been looking at monitoring these nuclear plants all along so you know or should know the status, the safety status of these nuclear reactors at current times I would think.

Mr. JACZKO. We believe right now we have a very strong regulatory program in place that ensures the safety and security of the fleet of operating reactors. Of course, when you see an event like what happened in Japan, we always want to take information from that and use that to improve our process, to improve our regulations if there are areas that need to be adjusted. And that is really what—the focus of this short term review, which will be a 90-day review, will really be on the short-term look.

Are there some things, actions we need to take immediately just to continue to ensure the safety?

But again we believe we have a strong regulatory program in place right now that involves multiple layers of redundancy in defense in depth so that if we were to have an event, like a natural disaster comparable to something like that in Japan, we have some confidence now that these multiple layers of defense in depth would ensure ultimately that the public is protected and that there is not exposures to the public of radiation that would be harmful.

Mr. PASTOR. Well, I always made the assumption that your safety regiment today would currently look at models to say if you are up in San Francisco, there is a high probability that you are going to have an earthquake and that possibly is of this magnitude. Therefore the reactor, because of how it is constructed and, you know, where it is, this is a probability that would have this failure or not have the failure. I would think you are making those assessments, or have made those assessments, all along.

Mr. JACZKO. We have. We look for all types of natural disasters or natural phenomenon like hurricanes, earthquakes, tsunamis. We look at the historical record, and all of our plants are designed to make sure that they can deal with what we think are the maximum historical natural disasters that have occurred in any area. So, for instance if it is a power plant on the West Coast, we look at earthquakes that would be within about a 200-mile radius of that plant, and we require the plants to be able to be designed to deal with an earthquake that is the largest earthquake we have seen for that area. And then we add a little bit of kind of margin to that just to make sure that we have captured some of the uncertainty about what may have happened historically.

And then if you look beyond that, we also have a program where we require the plants to—or the plants have looked at these kinds of severe accidents and they have procedures that they have developed so that if something were to happen that we never envisioned or could not imagine, that we know the plants will be able to cope with that situation.

And I think the last real significant piece that we have right now that gives us strong assurances right now that we have a safe program is following September 11th we put in place requirements for all of the plants to have procedures and equipment already developed again to deal with a very catastrophic event at a nuclear power plant.

Our thinking at that time was more events that were terrorist related, but the end result is ultimately the same, that if you have a damaged condition at the plant or significant damage to the plant, all of our plants are required to be able to mitigate that and ultimately do the important things, like keep cooling in the reactor core and keep cooling water in the spent fuel pool. So, we think we have a very strong system, but we are a learning organization, and we do not want to miss an opportunity to improve our regulations, improve our understanding of safety to continue to make sure that we provide the best program for the American people.

Mr. PASTOR. Since you have had this ongoing safety regiment all along, because that is your responsibility, what is your assessment right now of our nuclear plants in the United States and the ability to assure the American public that right now the construction and the operation at the plants are safe enough that you are not losing sleep at night?

Mr. JACZKO. Well, the program, as I said, we have in place we think is a very strong program that provides safety for the existing fleet of reactors. It is something we worry about and we think about every day. That is what the 4,000 men and women who work at the NRC come to work every day doing—is to make sure that the facilities and materials we regulate are safe and secure. And that is—more specifically, at each of our reactor sites, for instance, we have two or more inspectors who are there pretty much full time to continue to oversee and inspect the facilities and identify problems where they see them and ensure that those problems get addressed. So, it is a very active program. It is continuously monitoring the plants and their performance, and where we find challenges, and there always are areas where the plants can do a little bit better, we make sure that those are addressed, identified, and then corrected.

Mr. PASTOR. Getting all those data, having those safety inspectors being briefed every day, and all the reactors we have, do you feel very good that our reactors are safe? Do you feel somewhat good that our reactors are safe? Or are you worried that our reactors are not in a very good safety condition? What is your assessment—and that is all I am asking? How do you feel about it?

Mr. JACZKO. I feel very good that we have a strong safety program.

Mr. PASTOR. No, how are the reactors? You have a great program, but how do you assess them? I will agree with you. You have a great safety program.

Mr. JACZKO. We——

Mr. PASTOR. What is your assessment right now of our nuclear reactors in terms of are they safe enough or do you have problems in some of them?

Mr. JACZKO. Right now we have very good performance from the actual reactors. We have generally a system of review that we have for each of the reactors. And right now there are approximately six plants that are in one of the areas of more intensive review from a safety perspective, and those are the plants that we right now are most concerned about. But again we have a very conservative system, so we like to identify problems early and ensure that that they can get addressed early. But with the exception of those six plants, the remaining plants really in this country are operating well within our safety requirements and we believe are operating safely. And, again, all of the plants right now are meeting our safety requirements and we believe are operating safely.

Mr. PASTOR. Thank you, Mr. Chairman. I yield back.

Mr. SIMPSON. Mr. Rehberg.

Mr. REHBERG. Thank you, Mr. Chairman.

One of the natural phenomena of catastrophe is initially an overreaction. So, my question is on the short-term effects of the disaster on America's construction. You had mentioned there is going to be an ongoing review of the construction. How many plants are currently being constructed? Is it two or four?

Mr. JACZKO. We have—right now we have limited construction activities ongoing at two facilities.

Mr. REHBERG. Where are those?

Mr. JACZKO. One is in Georgia; one is Texas. And then, again, there is site preparation work and other types of site work going on at a third reactor right now.

Mr. REHBERG. Do you anticipate any delay in review and approval of various phases in the Georgia and Texas facilities?

Mr. JACZKO. Our plans right now are to continue doing our reviews at the pace that we were before the Japanese event. We certainly will—if there are lessons from any of these reviews that we are doing, we certainly will incorporate them into the review. But at this time we are continuing with the resources we have to move forward.

Mr. REHBERG. Okay. I have kind of mucked around France looking at their process. I have been to Chernobyl. Are there any similarities between Three Mile Island, Chernobyl, and this that are glaring; that just kind of poke you in the head?

Mr. JACZKO. Well, I think—again, it is very early to speculate on what happened in Japan and what the real contributing factors will be. It will take some time before we really know.

Mr. REHBERG. Well, you know, you always seem to hear cooling, cooling, cooling, cooling. And you would think that maybe you would have a cooling process in place. I mean, does that seem to be a similarity among all three?

Mr. JACZKO. The events at Chernobyl, Three Mile Island, and the events in Japan are all very different in terms of what happened and the causes of each of those, although the one common factor that appears certainly in Three Mile Island and Chernobyl is the impact of human error and people making wrong decisions. So, that is always something that we look at, and following Three Mile Island we had a very strong program put in place to enhance the training and the qualification requirements for operators at nuclear power plants to ensure that they would better deal with these kinds of emergency situations that may develop. So, there is very extensive training. They now spend a lot of time on simulators to ensure that they can handle an abnormal type of occurrence. But it continues to be an issue that we focus on and want to really make sure is working appropriately, because it is certainly a factor.

Mr. LYONS. Just to add a little bit, Mr. Rehberg, as you are probably well aware, Chernobyl was a very different type of reactor and quite distinct in its operating characteristics from either TMI or the reactors in Japan. Now, there are similarities, at least in the sense that they are light water cooled, between TMI and the Fukushima reactors. However, at TMI there was very little release, certainly not health significant releases off site, and there were no—there were basically no injuries from TMI. It is clear already that the Fukushima situation is substantially worse than TMI.

Mr. REHBERG. Ok, let me ask about Japan and Three Mile Island. Do they—I mean Yucca. Do they store their spent fuel on site in Japan, or do they have a central repository for waste?

Mr. LYONS. Oh, well, Japan has several different approaches. However, at Fukushima there were a total of seven spent fuel pools. There is one for each of the six reactors at Fukushima Daiichi. In addition, there is a very large central spent fuel pool at that site, and they also used dry cask storage.

Mr. REHBERG. So, is there similarity, though, among the nuclear industry in Japan to——

Mr. REHBERG. All of our plants——

Mr. LYONS. Yeah, something comparable to Yucca.

Mr. REHBERG. Yes, again, comparable to Yucca.

Mr. LYONS. We are looking——

Mr. LYONS. Yeah, all of our plants have spent fuel pools. The majority of our plants are now utilizing dry cask storage. Japan has also reprocessed some of their used fuel, not—well, very little of it Japan at this in time. There has been some reprocessed in France and some in the U.K. I am less sure on their progress towards a long-term repository. I know they have some programs, but I do not know the details at all.

Mr. REHBERG. Does this change your attitude at all about Yucca with storage on site and all the facilities that we have in America? I know you cannot get too far out on a limb on this.

Mr. LYONS. Well, I would start from the perspective that based on the NRC regulations, I believe—well, they believe—I believe, and I believed when I was on the NRC, that both spent fuel and dry cask storage.

Mr. REHBERG. It does not change the fact that we eventually need to work towards—I used the word "sustainable" before. A sustainable national policy on the back end of the fuel cycle. I am looking with the great anticipation towards the report of the Blue Ribbon Commission. That interim report will be available in July, and I believe that report will provide very important guidance as we look towards a range of options which could involve a once-through cycle, like we have had, leading directly towards a repository. It could involve work towards a re-processing type of economy in the future. And the research programs within my office span the gamut of the different options that could be used for used fuel. And those programs may be refined after we have the BRC report.

Mr. REHBERG. Okay. I just want to go back to one point that the chairman made. And as far as a supplemental on additional money being required or necessary.

You probably do not want to prioritize, but if you were to prioritize your expenditures in your budget for fiscal year '12, is it the 90-day and the 6-month review? Or the ongoing licensure of the two plus the partial third construction?

Mr. JACZKO. Well, those would happen in very different parts of the organization. So in a sense those would both have, I think, equal priorities as we go forward.

Mr. REHBERG. And you have enough money for the ongoing concern? Again, I cannot help but think of my neighbor to the left here in Louisiana with the, you know, the overreaction as they started this whole conversation. The overreaction of the disaster down in the Gulf by the administration pulling back and making it very difficult to permit. I just do not want to see that happen. This is too important to our comprehensive energy policy to see any kind of a delay in new construction as a reaction to something that occurred somewhere else, especially if the processes are different. The safety is different. Then, you have a protocol for safety in place.

I just want to be assured that you have got the money necessary to continue the ongoing permitting process of the new construction. And in your reaction to go out and take a look at all the others and spend the 90 days and the 6 months, it is not going to affect our energy policy in this country.

Mr. JACZKO. Well, I would say right now we have the resources to continue with the licensing activities and the licensing reviews that we are doing. We are budgeted in 2012 to begin the possibility of construction inspection and construction activities for some of those reactors if they are successfully licensed.

But I do not want to prejudge the outcome of any of the reviews that we are doing and say right now that there may not be impacts. It is certainly possible that there will be. We will have to wait and see what the information tells us. But right now, we are continuing to move forward on the licensing activities that we have. And right now, there is not really an impingement on our budget as a result of that.

Mr. REHBERG. Okay, thank you.

Mr. SIMPSON. Mr. Fattah.

Mr. FATTAH. Thank you. And let me thank both of you for your testimony. You know, obviously for the last 30 years—since the Reagan administration forward—we have not built any nuclear power facilities in our country. So, I know that this administration wishes to move ahead. We will take into account any of the safety concerns that need to be taken care of as we move forward, and I support the President's call for a safety review.

So I think that we should move forward. But obviously we have to be able to take into account that there has been a tremendous calamity because of the earthquake and the tsunami. One of the main issues at the heart of the problem in Japan is the spent fuel sitting in pools. Now, we have slightly more than 60,000 metric tons of spent fuel here in the United States. And you said that it is in dry casks. Is that the term you used?

Mr. LYONS. Dry casks or spent fuel pools.

Mr. FATTAH. Right. And so, this is a challenge that we have to think through and I think the Blue Ribbon Commission and its review will help inform us on this point. But first and foremost, I think the administration should be commended. Because it is inexcusable over the last 30 years that we have done nothing on this. And through many, many administrations we have known that nuclear has to play a part of our energy mix going forward.

So, the fact that you are moving forward in at least a couple of instances—and I know that the NRC is reviewing a number of other proposals and your decision package will help us kind of figure out the total deal flow in terms of the number of units. But it will be somewhere in the four or five.

The Secretary of Energy has come out—and I guess I will start with you, Dr. Lyons—over the last 72 hours very strongly related to the small modular reactor program that you referenced in your testimony. And now this is going to be the focus, this is going to be based at Oak Ridge. Is that correct?

Mr. LYONS. Once we have a budget, we would look towards a competitive process to identify two locations for demonstration projects. Oak Ridge has certainly discussed their interest in this, but they would go through the competitive process.

Mr. FATTAH. I understand. And the idea here, just so we can talk about it in English, is to develop these small, modular reactors that can be made in factory, and then deliver it to site and, therefore, cut the cost. There is tremendous costs in building a new plant.

There is this other idea that Bill Gates has been pursuing in terms of TerraPower. And in your research budget, is this one of the items that you will be looking at in terms of new designs perhaps going forward?

Mr. LYONS. Our program in small modular reactors has two components, at least the requested program. There is the 67 million that we are requesting for the licensing demonstration and another roughly 30 million for review of advanced concepts.

The Gates concept is similar to several other ideas that are also being considered around the country. And yes, I anticipate that those kind of ideas would be explored within the advanced component of our SMR program.

I am trying to distinguish between reactors that we think can be deployed quite soon of the small modular reactor type——

Mr. FATTAH. That is a different—yes. I am separating it, too, also.

Mr. LYONS. As opposed to two more advanced. And the ideas proposed by Mr. Gates certainly are in the more advanced, extremely interesting, but definitely the more advanced and longer term.

Mr. FATTAH. Let me try to break these apart. So on the first level, the administration is proceeding forward with some number of what we might refer to as more traditionally designed nuclear reactors, both in Georgia and Texas, and whatever other decisions that the NRC may make about permits that would be offered under the loan guarantee program through traditional financing. And then separate from that, the Department plans to move forward.

That is number one. The Department plans to move forward in terms of the small modular reactor at least in two locations in which they would be competitively determined.

Mr. LYONS. Yes, sir.

Mr. FATTAH. That is number two. And then looking into the future, you are looking at newer designs that can alleviate a number of the challenges going forward. One of those could be, for instance, similar to the Bill Gates approach related to TerraPower, which are reactors that in some ways get around some of the questions around spent fuel. Is that correct?

Mr. LYONS. Yes, in general that is correct. The Bill Gates approach would be one very interesting approach on unused fuel management. It could certainly contribute.

Mr. FATTAH. And this is something that would be a part of some of the research that you are asking for in the FY '12 budget?

Mr. LYONS. Yes, sir, very much. It would be research on advanced concepts, which will include the types of—we call them fast reactors that would be involved in the proposal that Mr. Gates is proposing.

Mr. FATTAH. But you have a bifurcated approach moving forward on a number of different levels. And what I am suggesting is that that is in face of 30 years of us doing zero. And I think that is an admirable position for the administration, and should be noted by the public.

Thank you.

Mr. LYONS. Thank you, sir.

Mr. SIMPSON. Mr. Nunnelee.

Mr. NUNNELEE. Thank you, Mr. Chairman. I just want to follow up really on some of the questions from a couple of my predecessors.

You put together a budget, submitted it, and then we had this tragedy in Japan that none of us could have anticipated. And appropriately, you are reacting in the United States to ensure the safety of our citizens. But that could not have been anticipated in your budget request that you put together. And so I just want you to reassure me that the process of reviewing pending applications for licenses is going to continue to move forward in the same manner that it was before the tragedy in Japan.

Mr. JACZKO. As I said, right now the work of the oversight and the safety of the existing fleet of reactors is a very separate budget item from the new reactor licensing reviews that we are doing. So right now we will continue to move forward on the pace we would have prior to the events in Japan with the new reactor licensing activities. But, again, we are doing reviews to see if there is not some information that we need to accommodate or incorporate into our understanding of safety for the existing fleet and possibly for the new reactors.

So, I do not want to prejudge what comes out of those reviews, but right now certainly from a budget standpoint we have the resources we need in order to move forward with our plan schedules for new reactor licensing in the U.S.

Mr. NUNNELEE. And certainly that should be your position. You should not prejudge. But I want to make sure you have the resources you need to adequately make those reviews. And there are not going to be any inordinate delays because you do not have the resources you need.

Mr. JACZKO. Right. Right now, we do not see a resource challenge. Although I will be clear that in fiscal year 2011 we have some amount of carry over funds from previous fiscal years that we would reprogram when we finally get a fiscal year appropriation. And we would reprogram those funds to help cover the costs of our ongoing incident response activities with the Japan events.

So if we were not successful with that reprogramming, then we would have some challenges dealing with resources in fiscal year 2011.

Mr. NUNNELEE. I guess 2011, if we do not get things worked out we are all going to have some challenges after Friday.

Thank you, Mr. Chairman.

Mr. SIMPSON. Mr. Olver.

Mr. FATTAH. He will be right with you.

Mr. OLVER. Mr. Chairman, I thank you very much. I actually am going to pass on this round, if I may, because I have just come in and I wanted to get a sense of what has been missed. I apologize for not being in here earlier, but I had something rather important.

Mr. SIMPSON. No problem. We will get back to you.

Let me ask Dr. Lyons about SMRs. Give me what you see as the advantages of SMRs, the challenges of SMRs, the economics of SMRs versus the Gen III+ reactors. How do the economies of scale work here? Tell me why this, I guess, new soup du jour is small modular reactors.

Mr. LYONS. Mr. Simpson, let me start from several perspectives. As far as some of the advantages, these much smaller units allow the developers to take advantage of highly passive features in the plant. By "passive" we mean in virtually any accident scenario one can imagine that there is very few or no operator actions required, that there is not a dependence on AC power. One does not need emergency diesel generators. One can rely on natural forces, gravity and convection, to adequately cool the reactors. So, that is in terms of one key advantage, the passive safety.

Another key advantage, again, the smaller size. Any of the vendors that I have heard of at this point are looking at underground siting. The underground siting may offer some very important advantages from the standpoint of security. Probably also will offer advantages from the standpoint of seismic, in the sense that you do not have a large structure, if you will, up wiggling in the breeze. So, those may all be advantages.

Now on the economics, I think those need to be proven. We and a number of vendors have done studies which suggest that the fact that these can be built in a factory setting and transported largely completed to a site leads to rather dramatic savings in the construction costs. A number that is derived from the nuclear submarine business, which I have heard from a number of different sources, is that as the nuclear submarine program has moved from essentially building each sub intact as one unit and has moved towards so-called modular construction where large modules are built in a factory setting, that the time and cost savings has been about a factor of eight.

Now, it remains to be proved that that can be demonstrated effectively for the small modular reactors. And that they can come in at the cost targets that the vendors are proposing. If they can do that, then it would appear that they will be another very interesting option compared to the large plants, such as the ones being built in Georgia, South Carolina, that are also passively safe but offer—the large plants lead to substantial challenges from the standpoint of financing. For the large plants, one is talking about costs of the order of 5 billion or more in overnight costs, and typically these sites are 2 plants, so double that. Or two units, I should say.

If you compare that to the size, the capitalization of many of our utilities, building one of the large plants is getting close to a bet the company proposition. That still may be very appropriate for some companies, and the administration remains very supportive of the large plants being constructed and that is demonstrated by the loan guarantee at the Vogel site.

But the small modulars may present another paradigm which may offer different opportunities for other utilities. Ones that cannot look towards the $10 billion investment and are far more interested in, if you will, much more bite-sized chunks of both power and economic costs.

Mr. SIMPSON. What is the cost of an SMR, roughly? Any idea?

Mr. LYONS. The targets for cost from the various vendors range in the 4,000 to 5,000 or so per kilowatt number. That is the same general range for overnight costs for the large plants. In other words, a 100 megawatt plant of the order of 500 million as opposed to the $10 billion number. Again, those are projections——

Mr. FATTAH. Gentlemen, we all know these would be 700 megawatts at the max, though?

Mr. LYONS. The small modulars—we are using—what we have been using as a definition, 300 megawatts. But I think an even better definition is simply that they are amenable to factory construction and transport to the site. We have used 300 megawatts as the upper limit, though. And the IAEA has suggestions of the 300 megawatt level as well.

Mr. SIMPSON. Any challenges in licensing SMRs relative to your staff, your budget, et cetera?

Mr. JACZKO. For fiscal year 2012, we are budgeted to be able to support the applications for the SMR designs that would get Department of Energy support. So we are anticipating right now at least one design review in 2012, and one actual license application in 2012 for a site with the Tennessee Valley Authority. And I think, as Dr. Lyons has indicated, there is multiple activities then. We are doing research and licensing framework development for the NG and P project, which is also kind of combined in that advanced reactor area that we are working on.

So right now we think we have the resources and we need to do what we think is anticipated in 2012.

Mr. SIMPSON. Okay. Dr. Lyons, your budget request provides $97 million for a new program, nuclear energy-enabling technologies. Some of that funding is for existing modeling and a simulation hub and some of it is for the Idaho User Facility, but almost 60 million appears to be for new programs. Your request says the programs are for crosscutting and transformative research, but I would like a better idea what that is and what we expect to get out of it and what do we expect next year when you come back for the next budget?

Mr. LYONS. In the crosscutting area, we are identifying a number of areas of technology that do not fit neatly within either our reactor or fuel cycle programs. These would be areas like advanced manufacturing, advanced instrumentation, nonproliferation. Where they—well, we have used the word "crosscutting" because I think that is the best explanation.

Just to take proliferation for an example, we need to evaluate the proliferation potentials on whether we are talking from the reactor perspective or the fuel cycle perspective. And we see that the crosscutting place is a very good—is the best opportunity to do that.

Advanced materials is another area for emphasis within the crosscut. And again, the material challenges that are faced on the reactor side will share many similarities with material challenges that will be shared on the fuel cycle side. So, we are viewing this as an efficient way of better organizing programs, some of which are ongoing under either the reactor or fuel cycle area.

And the transformative area, I would describe that as ensuring that blue sky ideas have an opportunity to come to the forefront, to be evaluated, and if interesting and promising, to be funded to the point where we can understand whether they, again, would fit more logically into one of the larger programmatic areas.

Mr. SIMPSON. Your 2012 request in your overall budget goes down $30 million. At the same time, you propose to increase program direction by $20 million. Explain what you plan to do with $20 million additional in program direction.

Mr. LYONS. The largest source of the need in the program direction is that we have taken over within my office the remaining functions of the Office of Radioactive Waste Management. And we have added a number of staff from the Las Vegas office into our program, based on those new responsibilities.

Mr. SIMPSON. Okay. I am going to go through again and then we are going to get back to a subject that is near and dear to everyone's heart. Mr. Pastor?

Mr. PASTOR. On the last point, is it your offices where the technical papers from Yucca Mountain have been deposited?

I know we are trying to salvage as much as we can in terms of the technical knowledge, the paperwork, et cetera, and some personnel.

Mr. LYONS. The personnel and certainly their knowledge is resident in my office. The records management, the reports that you indicated, that is being handled through the Legacy Management Office at the Department of Energy. And in fact, there are a number of different offices across the Department that have different responsibilities in different aspects of the closed office.

Mr. PASTOR. How many personnel have been moved here, to your site, from Yucca Mountain?

Mr. LYONS. We had between 20 and 25 people added into my office in an area that we have labeled as used fuel disposition within our fuel cycle program.

Mr. PASTOR. In the 2010 budget which was adopted, I think it was $12.5 million for the startup of the hub, the nuclear hub? The modeling and the simulation?

Mr. LYONS. I think it was a number like that, at least. Yes.

Mr. PASTOR. How much was it? Oh, $22 million.

Mr. LYONS. Okay, that is more what I was remembering. That is—yes.

Mr. PASTOR. And we are now, what, we have been at it for a year. What is the status of it? Could you go to more detail other than we are going to have an announcement here soon? $22 million in a year, what have we gotten from it or for it?

Mr. LYONS. I have tremendous optimism for the modeling and simulation hub. It is an attempt to bring modern computational tools to the nuclear power industry.

Mr. PASTOR. The question is, you have had a year and $22 million. And your optimism, that is good. But what has it brought us to date? What is the status of it?

Mr. LYONS. They are releasing—this month, they will release the first version of their virtual reactor simulation code. And that code, which they will continue to develop throughout the five years of this process, is focused on a software or a computational rendition of an operating reactor. Our goal is to use that code and modern computing to try to better understand safety and efficiency aspects of operating reactors, and, frankly, to bring the nuclear power industry into the regime of modern computing, which they have not been in. Again, I can go into more detail, but.

Mr. PASTOR. I would like for you to go into more detail because, you know, we have spent $22 million and we have had a year. And I am just curious how that money has been spent and what we—as a result, we have a code, so.

Mr. LYONS. This is a modeling and simulation center, so the result is a code.

Mr. PASTOR. No, I understand. What is that?

Mr. LYONS. The result of this now and in the future will be codes and simulations that will help the nuclear industry better understand particular details that have not been amenable to the existing codes.

Just as some examples: When a utility considers upgrading the power of an existing reactor, they utilize the tools that they have available in working with the NRC to develop a case as to whether that the power of that reactor can be safely upgraded. With these new tools, I think we can do a far better job of defining the safety margins and helping the utility and, hopefully, helping the NRC better understand the safety case for that upgrade.

It may be possible, using this code, to increase the already impressive capacity factors, which are around 90 percent in this country. It may be possible to better understand some of the problems that still plague our industry with problems in fuel pins. Occasionally, some of our sites will have a leaking fuel pin. And there's tremendous efforts that go into trying to minimize those leakers, because that requires, in many cases, shutting down the reactor, finding the leaking pin before they can move ahead.

It may be possible to better understand the development of the different sources of degradation of those pins and avoid those leakers. That could be very important to the industry.

Those are all examples of the vision that we have for applying high-performance computing tools to operating reactors. And of course, if this continues into the future, we would expect to expand this to advanced reactors in new systems. But we thought the most important first step was to literally move the nuclear power industry into the regime of high performance computing.

Mr. PASTOR. I have the same—I do not know what—I would describe it as I've been with Mike here in this Committee, Subcommittee for a number of years. And two years ago, maybe it was three years ago, the hydrogen fuel cell was the silver bullet. And now with this Administration it is the hubs, and we have supported them, as you know. And that is why I was asking the question, because there is still uncertainty in all honesty, regarding the makeup of the hubs, the money that is invested, and what will be the result? And so in the 2010 bill, when this hub was created as well as the other one, we asked for transparency and also for reporting, so that the Subcommittee would have the knowledge to ensure that it had the information, so as we went forward, that we knew that the money that is increasingly becoming more scarce was a good investment.

And even today, yesterday we had a hearing with the Office of Energy Efficiency and Renewable Energy. And still, you have the hubs, you have the frontiers, you have ARPA-E, and sometimes the connections are not that easy to define or see. But the hubs seem to be a way of addressing some of the needs that we have in our country as it deals with energy.

So we just are asking that you keep the Subcommittee informed, because when you have greater transparency and more information, then the decisions that we make here about the funding makes it easier in terms of understanding what you are doing and what the objective is in the future.

Mr. LYONS. That is correct. If you or your staff or any of you would like a briefing on exactly what has been going on with the hubs—with our hub—I would be very happy to provide that. I view it as a great success story already, and I think over the five years it will be an even more dramatic success story.

Mr. SIMPSON. Mr. Fattah.

Mr. FATTAH. Thank you. Well, I just have one question because I know we have a nuclear scientist who wants to ask some questions here. So I just want to go back because I did not probe this particularly as well. We have about 63,000 metric tons of spent fuel, some of it in pools, some of it in dry casks.

As part of your review, you, I assume—and I guess just to put on the record, you are going to review the entirety of the circumstances relative to the safety of the spent fuel that exists here at our hundred plus nuclear facilities, right?

Mr. JACZKO. Yeah, that is certainly a part of what we will look at, but again to reiterate, we believe right now fuel is stored safely in spent fuel pools and safely in dry cask storage.

Mr. FATTAH. I believe it's fuel that is stored safely too, but I have no actual knowledge about it. So the nuclear regulatory—you are going to look at it again in each and every instance in terms of what type of facility it is, how robust the facilities are, and what redundancies are built in. Because in Japan what you have was a set of calamities, you know, that caused the problem. And most of the problem, if I am correct, relates to the spent fuel being in these pools.

Now, we have some of it in pools here, and we have some of it in dry casks, right?

Mr. JACZKO. That is correct. And again——

Mr. FATTAH. And again, can we quantify which is which? How much of the metric tons are in pools and how much are in dry casks?

Mr. JACZKO. We can get you that number, but right now the majority of the fuel is in pools.

Mr. FATTAH. But is one safer than the other?

Mr. JACZKO. We think that both——

Mr. FATTAH. I know you think both are safe.

Mr. JACZKO [continuing]. Are safe.

Mr. FATTAH. I am asking in a relative sense is one safer?

Mr. JACZKO. It is not clear at this point. They both provide a very, very high degree of safety. And when you get into the level of safety that we are talking about, yeah, the likelihood of anything happening is so small in a spent fuel pool, and it is so small in a dry cask storage that it is hard at those very, very small levels to really say one is more or less safe because it is just a very, very low likelihood of any concern.

And I would just add that we are constantly reviewing and monitoring the safety of the spent fuel pools of the dry cask storage. So the review we are doing is not a review to——

Mr. FATTAH. I am not trying to cast any suggestions to the contrary, and I do not think that it would be right to do so. I am pro nuclear.

Mr. JACZKO. Mm-hmm.

Mr. FATTAH. Part of this process is spent fuel. Now, we have a lot more of it than, for instance, than the French do. They have a different process altogether, right, in terms of reusing this.

But, Dr. Lyon, would you care to offer to the Committee whether or not one process is better, the dry cask versus the pool? You have a degree from Cal Tech in astrophysics, and we are just politicians, so.

Mr. LYONS. I would give you the same answer that Dr. Jaczko did: They are both carefully evaluated; they are both safe.

Mr. FATTAH. So you take the spare fuel, you put it in water and you put it in some kind of building, right?

Mr. LYONS. Yes.

Mr. FATTAH. Versus you create some kind of more solid dry casking of it. And both of them provide the same level of safety?

Mr. LYONS. Both, I believe, are safe.

Mr. FATTAH. Because in a more common sense circumstance, for someone who did not have a lot of this information from a scientific basis, does one suggest it is a little more safe than the other?

Mr. JACZKO. Congressman, if I could add, they perform different functions. The fuel when it comes out of the reactor is very hot. It needs at that point to go into a pool in order to dissipate.

Mr. FATTAH. To cool, right. So you suggest that it should be in the pool for five to seven years. We have spent fuel that has been in pools for a lot longer than that, all right?

Mr. JACZKO. Mm-hmm.

Mr. FATTAH. So I am just trying to figure out whether it should be in dry casks or not, and I do not have the scientific basis to know, which is why I am asking you.

Mr. JACZKO. And what we know and what we have looked at is as the fuel gets cooler, so as it is in the pools for a longer period of time, it presents a much lower risk. So the fuel that needs to go into the pools is the hotter fuel, and that cannot go immediately into dry cask storage.

So the challenge is that you have what the fuel is to be when it is hotter and when it is more recently out of the reactor. That can only go into the spent fuel pools.

Mr. FATTAH. I got you, Chairman, but follow me for a minute. You are the NRC. You recommend, as I would understand your regs, that it should be in the pool for five to seven years.

Mr. JACZKO. We actually, as part of our regulations, we require that it be in there for at least a year. We have approved fuel being removed from a pool within three years, but generally it is kept in the pools for about five years. That is kind of the minimum assumption.

Mr. FATTAH. But we have fuel that is in pools beyond the suggested realm.

Mr. JACZKO. Again there——

Mr. FATTAH. In our country.

Mr. JACZKO. There is no the five years is not a maximum time.

Mr. FATTAH. That is not my question.

Mr. JACZKO. Right, so we have fuel that is in the pools that has been there longer than five years.

Mr. FATTAH. Okay, but is that safer, that fuel safer than if it was in dry casks?

Mr. JACZKO. As I said, we do not have technical information right now that says that it is safer in dry casks versus in the pools. It is both at a if I could, it is like winning the Powerball versus winning, you know, the or another lottery that happens. It is very, very unlikely that either you are going to win either one of those.

I think other than I think Congressman Sensenbrenner does fairly well with lotteries, but it is hard to say when you are getting at that low level of numbers. It is the difference perhaps between a one and a million times a million versus five in a million times a million. Those numbers at that level do not really tell you——

Mr. FATTAH. I understand. But you understand the odds of a tsunami and an earthquake at the same point that you got these spent fuel rods in Reactor 3 and I think it is 4 in Japan. So there was a set of dynamics that happened. At the end result, the danger relates to this spent fuel being in the pool.

So then we come to America. We've got spent fuel in pools. I am just trying to figure out if it should not be there past five years, whether we should be doing something else with it.

I know the Chairman wants to get to a broader range discussion of that, so I am going to leave it alone.

Mr. JACZKO. Congressman, we do not right now think that that is the case.

Mr. FATTAH. I got you. You think it is safe no matter whether it is in a dry cask or not

Mr. JACZKO. Right.

Mr. FATTAH. whether it has been there five years or not, and you do not think there is any relative difference in the level of safety——

Mr. JACZKO. Right.

Mr. FATTAH [continuing]. Notwithstanding.

Mr. JACZKO. Correct.

Mr. FATTAH. Thank you. All right, thank you.

Mr. SIMPSON. Mr. Olver.

Mr. OLVER. Thank you, Mr. Chairman. I want to just ask a couple of questions about the deep burn fuel research program. I understand that you are hoping to extract a lot more energy out of the fuel that is put in and/or improve the fuel. I am sort of curious: what does it mean to improve the fuel, and, well, for a simple one, in the normal fission procedures, what is the burn level?

Mr. LYONS. If you mean the utilization of the original uranium in a once-through cycle, it is 0.6 percent of the actual uranium is actually used in the energy reduction production.

Mr. OLVER. Only 16/100ths of a percent?

Mr. LYONS. 0.6 percent, so.

Mr. OLVER. Six-tenths of a percent.

Mr. LYONS. Six-tenths of a percent.

Mr. OLVER. Six-tenths of a percent.

Mr. LYONS. That is starting from the original mined uranium all the way through the process. It is very low.

Mr. OLVER. Oh, but, well, what percent of what actually goes into the plant are the fuel rods? That must be higher than six-tenths of a percent.

Mr. LYONS. Oh, it is far higher than that, but you have thrown away a tremendous amount in the process in the enrichment process. Typically, fuel would be enriched into the roughly 4 percent range as it is loaded into a reactor and would come out when it is slightly below 1 percent uranium.

Mr. OLVER. Really?

Mr. LYONS. U-235, yeah.

Mr. OLVER. Oh, so you are actually using three-quarters of the uranium?

Mr. LYONS. Of the U-235 that was loaded into the fuel, which is very different than what was mined. That is I was trying to I started from the mining. Maybe that was confusing, sir.

Mr. OLVER. Well, I am interested in what happens with the rods. The rods are what percent of U-235? That has been enriched in the first place; the U-235 has been brought considerably above its isotopic abundance.

Mr. LYONS. Yes, sir, that is the roughly 4 percent, depending on the details. It can be some variation around that, depending on the reactor.

Mr. OLVER. So it is roughly 4 percent. But are you saying, then, that three-quarters of the U-235 has been used?

Mr. LYONS. Yes.

Mr. OLVER. In that process of whatever is going through what is it, a year and a half or so before you have to replace rods?

Mr. LYONS. The rods are typically in longer than that, but there are multiples. The simple answer is, typically, they are in for 3 cycles of 18 months.

Mr. OLVER. Okay. So that deep burn is trying to make certain that you have to be using three-quarters of the uranium by some other processing procedure, I take it. Maybe you need to explain to me what you mean by "deep burn." To me, I thought the word "burn" meant what percentage of the available fuel was being used up, which would be the percentage of the U-235 that is being used up in the first burn. And I have gotten——

Mr. LYONS. Okay. There are a number of different approaches that go under the general rubric of deep burn. They all look towards increased utilization of the uranium resource and/or the actinides that are produced in the——

Mr. OLVER. But you are still only able to get energy out of the reaction of the U-235. So three-quarters of it has been used in the——

Mr. LYONS. No, sir. In the process of the reaction, you start with U-235, yes. But you build up plutonium, you build up other actinides, and those also contribute to the fission process. And, in fact, by the time the fuel comes out of the reactor, you have the order of, say, slightly less than 1 percent is now plutonium. So you start with U-235, yes, but in the process you are building up other materials, other isotopes that also fission.

But deep burn is a way of making better utilization and/or further destruction of the actinides. It is a process that is of considerable interest. That is why we have funded it rather well within our fuel cycle.

Mr. OLVER. Well, then you are going to repeat. You are going to do some concentration, reconcentration, or reformulation of the fuel, I take it, for additional burns, for going deeper than the original burn.

Mr. LYONS. Most of the deep burn ideas would involve some degree of reprocessing and reformulating the fuel.

Mr. OLVER. Then you are not going to be using in those fuels, you are not using that much more than the plutonium and the uranium in the second and sequential operation. You could include a number of the higher actinides, which are some of the troublesome isotopes from a repository performance standpoint, and at least some of the ideas of deep burn would involve destruction of transuranics and other actinides.

Well, okay. Clearly I am in over my head. The gentleman to my left who has just left notwithstanding.

Let me ask a little bit different question. On the the simulation and modeling hub, was that competed?

Mr. LYONS. Yes, sir.

Mr. OLVER. How many competitors were there?

Mr. LYONS. I am remembering three. I think I am correct.

Mr. OLVER. At least three?

Mr. LYONS. Yes, I——

Mr. OLVER. Were they all energy labs? Were they all—because you ended up choosing Oak Ridge——

Mr. LYONS. We chose——

Mr. OLVER [continuing]. One of our——

Mr. LYONS. Oak Ridge was the winner. The other two that at least I am remembering, and I could be forgetting one, one was led by Argon, one was led by—it was either Utah or Utah State. I am not sure which one.

Mr. OLVER. But each of them has—cooperation, collaboration, it was—was it not drawing on resources outside the Argon or the Oak Ridge——

Mr. LYONS. You are absolutely correct.

Mr. OLVER [continuing]. Hub?

Mr. LYONS. Yes. They involve——

Mr. OLVER. How many of those—in the case—when was the actual hub chosen? When was it contracted? When was the award made, there must be some sort of a process or contract being written as to who is going to do what as the products that you are going to get out of it?

Mr. LYONS. I could certainly get you the precise dates, but my memory is that May of 2010 was the selection of Oak Ridge and their very large team. You are right, it is a very large team.

Mr. OLVER. How many of that team is now at Oak Ridge? It is not new buildings or anything like that that you are building. Is it not using more spaces that are not being used for other things?

Mr. LYONS. It—they are certainly taking advantage of virtual connections among the industry, other national labs, and universities. There was a facility being constructed at Oak Ridge for their advanced computing facility and the hub—the center of the hub will be housed in that.

That building was not constructed by the hub, it was being built as part——

Mr. OLVER. So, are people from these other—what did you call—you used the term they are——

Mr. LYONS. Well, virtual.

Mr. OLVER. Virtual, from those places that are in the virtual sphere, are some of those people going to be actually housed at Oak Ridge?

Mr. LYONS. Some will.

Mr. OLVER. Brought to it and housed at Oak Ridge?

Mr. LYONS. Some will, but the majority of the interaction will take advantage of the virtual interconnections.

Mr. OLVER. We are far too early to have any sense of what your success might be on that, are we?

Mr. LYONS. Well, as I indicated, this month the first release of the reactor simulation code will be coming out or is coming out. In fact, I think it is today or tomorrow. However, the intent is to build on that and to have a far more capable product over the five-year tenure that this is planned for.

Mr. OLVER. I am sure we would all like to examine that action code. I quit.

Mr. SIMPSON. You usually yield back, you do not quit.

Mr. OLVER. I quit.

Mr. SIMPSON. Turn off your mic then.

I would like to welcome member of the Appropriations Committee, Ms. Lowey, who, I understand, has requested permission to join the hearing today. I understand that a motion for Ms. Lowey to join will require unanimous consent from the subcommittee members present. Do any members object?

Hearing none, welcome to the committee, Ms. Lowey, and you are next in line.

Ms. LOWEY. Well, you are very kind and I would like to thank my friend Chairman Simpson, Ranking Member Pastor, Chairman Frelinghuysen, we all wish him good health. I am grateful for the opportunity to discuss a discussion issue of critical importance, the safety and security of those who live near Indian Point Nuclear Power Plant in Westchester County, as you know, is located within 30 miles of New York City. Approximately 20 million people live in the 50-mile radius surrounding the plant. My grave concern is that a terror attack, natural disaster, or other unexpected event could put Indian Point at risk and cause it to lose power, limit its ability to cool reactors, and cause a leak of radiation or radioactive material.

The government has recently recommended a 50-mile evacuation zone in Japan. If a 50-mile evacuation were ordered for Indian Point, millions of families from the lower Hudson Valley to New York City to parts of Long Island and New Jersey would need to be evacuated, however there is currently no plan and insufficient infrastructure to ensure an orderly evacuation in that event.

We simply cannot accept such risk. Yet the NRC, which oversees safety and security operations at the nation's 104 commercial reactors, has neglected terrorism and evacuations in relicensing decisions.

Despite the risk, factors such as population, security, insufficient evacuation routes, seismic and scientific data are not taken into account when determining the relicensing of nuclear facilities. Many of our commercial power plants are aging and are now or will soon be in the relicensing process. I hope to work with you in ensuring that the criteria used for relicensing protects the safety and security of our citizens.

I would like to read you a quote. Concerns regarding nuclear facilities within high population areas are not new. In fact, in 1979 the NRC's own director of the Office of State Programs, Robert Ryan, stated that, "I think it is insane to have a three-unit reactor on the Hudson River in Westchester County, 40 miles from Times Square, 20 miles from the Bronx. And if you describe that 50-mile circle, as I said before, you got 21 million people. And that's crazy. I'm sorry, I just don't think that's the right place to put a nuclear facility." Do you agree with this assessment?

Mr. JACZKO. No. I think right now we think that for Indian Point the plant is safe, it meets our strong safety requirements, and that in the very, very unlikely event of some type of accident that would possibly release radiation, that the right kinds of emergency protective actions would be taken to protect the population in and around the plant.

Ms. LOWEY. Well, I was very pleased also to hear Secretary Chu's statement on March 21, 2011 in which he stated that nuclear power plants in high-population areas with inadequate evacuation plans should receive further study and that officials should determine if these plans should remain in light of these risks.

Dr. Lyons, do you agree with that statement?

Mr. LYONS. I believe Dr. Chu was referring to the planned review that the NRC is undertaking and it will certainly be—well, as we have been discussing quite a bit today, that review will be taking into account the lessons learned from the Fukushima disaster in making sure that plants here are appropriately regulated to meet that concern.

Ms. LOWEY. Well, I think I just heard Chairman Jaczko make a statement that it was all safe and it is going through a relicensing process in 2013, so I would like to ask Dr. Lyons what steps will the Department of Energy take to evaluate whether these plants, and especially Indian Point, as Secretary Chu noted, should remain, and what factors—perhaps I should let you answer that. What steps are you going to take?

Mr. LYONS. Well, there is a clear differentiation between the responsibility of the Department of Energy and the responsibilities of the NRC. The review in question here is a responsibility of the NRC and I think Congress, I would say in a great deal of wisdom, separated the promotional aspects of nuclear power within the Department of Energy, from the regulatory aspects within the NRC.

So, we are not a part of a specific review of the safety of any specific unit within the country. We have many programs that impact or are oriented towards the research of safety of all systems, but we do not focus on a particular reactor from a licensing standpoint which is NRC's purview.

Ms. LOWEY. Well, then let me ask Dr. Jaczko, what factors should the NRC take into account in relicensing and why should the NRC not take into account high-population areas and the effectiveness of a proposed evacuation in relicensing determinations?

Mr. JACZKO. Well, the factors that you are talking about, these are issues that we look at on an ongoing basis with nuclear reactors. The availability of evacuation plans to be effective is assessed, I believe, on a biannual basis. So, this is not something we wait until the relicensing process——

Ms. LOWEY. Are you still looking at a 10-mile evacuation plan rather than a 50-mile that has been recommended in Japan?

Mr. JACZKO. The current program for emergency preparedness is basically built on two thresholds. The first threshold are those types of events that could happen in a very short period of time and would require pre-prepared and pre-planned evacuation plans and that gets you to the 10-mile emergency planning zone that we often refer to.

Beyond that, we have a 50-mile planning area that is, again, for events that are happening more quickly, is intended to provide a mechanism to ensure that food supplies and other kinds of contamination-related events could be controlled and dealt with, but in any situation, it is up to the state and local governments to provide the ability to take appropriate protective actions and that could extend beyond 10 miles, certainly if the events warranted that.

So, it is the preplanning that is what goes into the 10 miles that we have right now. And, again, we will be looking at a short-term, 90-day review of information coming out of Japan and then a longer review of information coming out of Japan, and I suspect that this is an issue that we will look at and see if there are changes we need to make with our understanding and concepts for emergency planning and emergency preparedness.

Ms. LOWEY. Well, thank you, Chairman Jaczko, thank you Chairman Simpson. I would just assume, and I encourage you to review this carefully, if the United States is recommending a 50-mile zone in Japan, I do not know why it would not be as good for the United States of America, and I appreciate your willingness to come tour the plant and meet with constituents. There is a great deal of concern and as I understand the news today, unfortunately, there is such a catastrophe there and I met with the ambassador yesterday from Japan who is so grateful for our help and assistance, and I guess the news today is they are planning to bury the reactors and just evacuate all the people.

So, I just thank you and thank you for allowing me to be here and I just hope there is a real thorough evaluation given the latest statistics and numbers and not just a routine stamp.

Thank you so much and I look forward to welcoming you to Westchester County.

Mr. JACZKO. Thank you.

Ms. LOWEY. Thank you, Mr. Chair.

Mr. SIMPSON. Thank you, Congresswoman Lowey.

Let us turn to a subject that any hearing with the NRC and NE would be incomplete without: a thorough re-discussion of Yucca Mountain. Probably the foremost expensive electoral votes ever cast in this country were the four Nevada votes in 2008. They cost us approximately $12 billion in shutting down Yucca Mountain or the attempt to shut down Yucca Mountain.

There seems to be a difference of opinion between Congress, past Congresses, past Administrations, and this Administration, about what the Nuclear Waste Policy Act does. It seems clear on reading it, to me, that Congress and the Administration, through law, enacted legislation which created Yucca Mountain as the nation's nuclear waste repository.

This Administration has a different point of view. I respect that. Disagree with it, but I respect it. It would seem to me that if we are going to close down Yucca Mountain as the Administration wants to do, the Administration needs to come to Congress and modify the Nuclear Waste Policy Act.

Is the Administration going to propose legislation to amend the Nuclear Waste Policy Act?

Mr. LYONS. Mr. Simpson, I am not a lawyer. Our general counsel has thoroughly reviewed the actions that have been taken, thoroughly endorsed the actions that have been taken as being within the—within the legal framework available to the Department. And I might note that I accepted this job with the clear understanding that we were—that Yucca Mountain was viewed as an unworkable solution, an opinion which I agree with, and——

Mr. SIMPSON. Unworkable in what way? Scientifically unworkable?

Mr. LYONS. The Secretary has made it clear that to be workable requires both a technical—from a technical perspective and a local support perspective. Technical perspective, I do not think I am prepared to comment on. That has not been determined. From a local support perspective, it has certainly not enjoyed that support.

Mr. SIMPSON. It depends on how local you want to get.

Mr. LYONS. It does, and as someone who grew up in Nevada——

Mr. SIMPSON. There are counties very close to Yucca Mountain that support it.

Mr. LYONS. I saw that up close and personal.

Mr. SIMPSON. There are counties very close to Yucca Mountain that do support Yucca Mountain.

It was interesting when we had this discussion with Secretary Chu. I mean, we all know what this is. It was a political decision. We all know that and we all know why it was done. I am not even criticizing that. I have kind of gotten to the point where I do not really care about Yucca Mountain anymore because it has become such a political issue that it is taking away from our, I think, drive to actually solve the problem. What bothers me is the law and I think this Administration's clear refusal to accept what Congress enacted and was signed by a President.

Now, I do not like throwing $12 billion away. I think it was a stupid decision, but that is my opinion. I think the attorneys that are interpreting that are looking beyond. Attorneys can interpret something to say pretty much anything that they would like their employer to say.

I notice that the NRC's review board said, no, you cannot withdraw it. The decision is still before the NRC. The decision has been voted on by the NRC of whether to accept that decision or not.

Mr. JACZKO. Well, Congressman, the—our voting process is an involved process——

Mr. SIMPSON. It has been voted on.

Mr. JACZKO. We have not, in our formal process, made a final decision on that. Voting at the NRC is not much as you do voting here. It is not the final action. In fact, the final action would be commission agreement on an order responding to the particular issue in question. That has not happened at the commission yet. There are ongoing discussions in regard to that.

I know that term voting gets used, but it is not in fact—our votes are often not even in a traditional form of a yes or no decision, they are often just opinions and commentary about a particular action, so——

Mr. SIMPSON. The other commissioners do not agree with you. They do not agree that they are just opinions. They believe that they are made well informed judgments and that they take a vote and that they are not just discussion points to be discussed until we have a majority opinion.

Mr. JACZKO. I am not familiar with any position of the commission that is contrary to what I have stated. The commission's procedures are well established. It is true for every action that we take. Voting begins and is not actually the final decision. The final decision on non-adjudicatory matters is actually something we call staff requirements——

Mr. SIMPSON. Well, let me tell you in response to an inquiry by Senator Inhoff, "On November 4th I filed my vote——"

Mr. JACZKO. Correct.

Mr. SIMPSON [continuing]. "On this matter with Secretary of Commission on August 25, 2010," Kristine Svinicki, Commissioner. On November 5th, "I have voted and registered my vote on September 15, 2010," William Magwood, Commissioner. On August 26, 2010, "I entered my vote on the adjudicatory matter referenced in your letter." William Ostendorff, Commissioner.

Mr. JACZKO. Correct.

Mr. SIMPSON. The commissioners believe they have voted on this and that you have purposely held up the vote with the argument that we will wait until we have a decision, because it seems to be split, one would assume, two to two. I do not know that. Nobody knows what the votes are. But you have stated in testimony before, I believe it was in a letter to Congressman Sensenbrenner and testified as recently as earlier this month in questions from Congressman Shimkus before the House Energy and Commerce Committee that you were "closing out the NRC's review of Yucca Mountain license application under established commission policy", your quote.

Mr. JACZKO. Correct.

Mr. SIMPSON. Yet, the motion by the Secretary of Energy to withdraw the application has been denied by the NRC's own licensing board and the appeal of that denial is still pending before the commission and has been since last summer.

Where is this established commission policy to terminate the review established? And by whom was it established? And is not commission action on the appeal necessary to establish the commission's policy on the question?

Mr. JACZKO. To answer your question, the commission's policy with regard to the review of the application is established in the commission's budget. In the fiscal year '11 budget, that policy was established to begin close out activities in fiscal year '11.

Mr. SIMPSON. Which budget passed in 2011?

Mr. JACZKO. We have yet to receive a final appropriation, however——

Mr. SIMPSON. So, there was no budget in 2011 essentially?

Mr. JACZKO. That, however, forms a policy document for the commission to begin its activity and consistent with appropriation law and interpretation of continuing resolutions, the correct action for the agency at the time was to look at the actions taken by Congress.

At the time, on October 1st, in subcommittee or full committee in the Senate, they had passed the President's budget, which had $10 million for close down of the program. In subcommittee in the House, they had passed an appropriations bill that included $10 million for closure——

Mr. SIMPSON. No bill passed Congress.

Mr. JACZKO. Correct. But——

Mr. SIMPSON. Just because the Administration proposed something does not make it law and does not make it a policy that needs to be followed because it has not passed. Congress has not spoken to this and in fact I have the commission's budget request language. It says, "DoE may submit to the NRC a motion to withdraw or suspend its Yucca Mountain license application during FY 2010. The NRC budget reflects that possibility. Upon withdrawal or suspension, the NRC would begin an orderly closure of the technical review."

If the commission still has the question of withdrawal before it, how can it be a precondition that has been met? It cannot be.

Mr. JACZKO. Looking at totality of the budget, I discussed that question with the general counsel and it was my view, and that view was supported by the Agency, that that particular phrase was not the prevailing sense of what the budget entailed. We had other programs in other areas that we were transferring money and working on resources on and we have moved resources to work in those areas.

So, the budget is a total document that provides the guideline and the direction for us to move forward in.

Mr. SIMPSON. The budget requests——

Mr. PASTOR. Would you yield?

Mr. SIMPSON. Not the budget, the budget request. Sure.

Mr. PASTOR. Well, as I recall, the 2010—the money that was appropriated, and that was signed by the President, was to continue the licensing process.

Mr. JACZKO. Actually——

Mr. PASTOR. The 2010, it was for all the monies that were there was to continue the licensing process and in 2011, we did not have—we were not able to pass a bill——

Mr. SIMPSON. We do not have a bill.

Mr. PASTOR. And so we do not have a bill——

Mr. JACZKO. Actually——

Mr. PASTOR [continuing]. So, basically are not you still working in the dictates of 2010?

Mr. JACZKO. In 2010, we received a reduction in funding. The original request at the time was, I think, for about approximately $40 million for license activities. That, actually what was passed by the Congress was a reduction to, I believe, $29 million with a recognition of my belief at that time that the program was on a path towards termination.

Mr. PASTOR. I would beg to differ from you because we—this subcommittee, in 2010, were not in accord of what was happening to Yucca Mountain and we passed a bill with the monies—there may have been a reduction, but the reduction was not an indication of this Subcommittee that we were in accordance with the termination of Yucca Mountain. So, I can tell you, I do not think that was ever the intent of this Subcommittee or this Congress to terminate Yucca Mountain with any reduction.

Mr. SIMPSON. Yeah. I firmly believe, and I, contrary to whatever your counsel says, that you are acting outside the law. And, in fact, it says—I have a letter from another commissioner, “The majority of the commission’s members supported language stipulating that orderly closure of the program activities would occur upon withdrawal or suspension of the license review. These precursors have not occurred.”

Mr. JACZKO. Again, Congressman, I appreciate you do not agree with the decision that we made. However, that decision——

Mr. SIMPSON. It does not matter whether I agree with the decision you made or not, it matters whether you are following the law.

Mr. JACZKO. And based on discussions with our general counsel, we believe that we are consistent with the legal precedent here and——

Mr. SIMPSON. Did this guy go to law school?

Mr. JACZKO. Yes, he did, and he is actually a very good general counsel, and I would add that there are multiple actions that have been taken by the commission in regard to this. The commission has, again, approved a 2012 budget, which in 2012 the commission approved zeroing out the program.

Mr. SIMPSON. The commission approval of a budget does not mean diddly.

Mr. JACZKO. Absent——

Mr. SIMPSON. It is what passes Congress.

Mr. JACZKO. Correct.

Mr. SIMPSON. And it is clear—two years ago—I think it was two years ago or three years ago, we had a motion on the floor to recommit the energy and water budget to strip out the full $192 million. Do you know how many votes that got? Thirty-five, I think. Something like that. Which is a clear indication that Congress has a different opinion here and the unilateral action of the Administration, and specifically the NRC, which I think is becoming more politicized. You are supposed to be a regulatory agency that looks at something without prejudice.

Mr. JACZKO. Correct.

Mr. SIMPSON. And I think you have taken it upon yourself to have prejudice in this case and decide for the rest of the commission.

As an example, you testified——

Mr. JACZKO. Congressman, if I could——

Mr. SIMPSON. Just a second. You testified before the House Energy and Commerce earlier this month that the commission had not reached a decision in the Yucca Mountain appeal, that you, as chairman, will not schedule a meeting of the commission to resolve this matter until you have had, and I quote here, "per statute, a majority position."

Mr. JACZKO. Correct.

Mr. SIMPSON. I asked my staff to go through the Agency's website and research your voting procedures. We were interested to find that in the commission's own procedures an appendix entitled "Resolution of a Two-Two Vote". It seems that you have a procedure. Is it not true that reading from your own procedures that a commission vote of two to two results in a denial of a motion in an NRC proceeding and in denial of reviewing of license board decisions? If so, why do you claim that the commission meeting to affirm final commission decisions are scheduled only if there is, as you testified, a majority opinion?

Are there cases where the NRC has made a two to two decision?

Mr. JACZKO. Congressman, I do not want to get into the ongoing adjudication and any discussion about——

Mr. SIMPSON. What do you mean you do not want to get into it?

Mr. JACZKO. It is something that by law I am not allowed to get into, in particular——

Mr. SIMPSON. We have not followed the law so far.

Mr. JACZKO. We have legal precedent that establishes that Congress does not interfere with the ongoing adjudications and that there is a——

Mr. SIMPSON. I do not want to—I do not want to interfere with the ongoing adjudication, what I want to know is why have you not scheduled what you would consider a final vote? And your argument is, not until we have a majority opinion, but that argument falls short of your own policies.

Mr. JACZKO. Again, that is based on an assumption that you have about what may or may not be in the adjudication.

Mr. SIMPSON. On your website.

Mr. JACZKO. And that is based on an assumption of what you believe may or may not be the votes in this particular matter. I am not going to discuss what the votes are, nor indicate what they may be.

Mr. SIMPSON. There only a couple of possibilities here. It is either two to two, because one person has recused themself. It is either two to two or it is three to one for, three to one against, or it is four to zero. I mean, there are not too many different options here.

So, the assumption, I think, is fairly clear that it is probably two to two.

Mr. JACZKO. And I am not going to comment on what——

Mr. SIMPSON. And I do not expect you to comment on it. It is an assumption I am making.

Mr. JACZKO. And, again, the actions that we are taking——

Mr. SIMPSON. But you said that——

Mr. JACZKO. The actions that we are taking as a body are consistent with the law.

Mr. SIMPSON. You said you would bring it before the commission when you had a majority vote. A majority opinion. If it was three to one or four to zero, you would have a majority opinion and bring it before the board. What is your excuse for not bringing it before the board?

Mr. JACZKO. Congressman, I think I have answered this question fairly clearly. We have a process——

Mr. SIMPSON. You have answered it, but not clearly.

Mr. JACZKO. We have a process for conducting our voting that ultimately requires there to be an order, that order has to have majority support, and it has to have majority support to go forward. That is from the statute. We take action by majority action of the commission.

Again, you may disagree or not appreciate that, but that is the current status of this situation. The commission continues to discuss and deliberate this matter.

Mr. SIMPSON. Is a two to two vote, if it were a theoretical two to two vote, a non action?

Mr. JACZKO. Again, I am not going to speculate about any of the matters in front of the commission. It requires a majority——

Mr. SIMPSON. Are you going to rewrite your policies on your website on what a two to two vote does?

Mr. JACZKO. Our statute is——

Mr. SIMPSON. Because if you would like, I can read them.

Mr. JACZKO. I am fully aware what the policies and procedures of the commission and everything we have done is consistent with the policies and procedures of the commission.

Beyond that, as I said, I am not going to go into the details of what is in the adjudicatory record. And I would add that at the time that we move forward on the budget decision by the commission, one commissioner did raise a concern that that was not consistent with commission policy. That concern was rejected by the full commission, so, in fact, there is again a commission policy establishing that we move forward with close out.

So, that is the policy of the commission. We fully intend, if we receive any appropriation or any direction from Congress, to comply with that direction from Congress or direction from the courts. And the action that we have taken, we believe, is consistent with not precluding any action by Congress either to terminate the program or to continue working on the program.

So, that is the position we are in. Again, I appreciate you may not agree with that, but I feel very comfortable that all the actions——

Mr. SIMPSON. No, it's not that I do not agree with it——

Mr. JACZKO [continuing]. Have been consistent with the law.

Mr. SIMPSON. As I said, Yucca Mountain is to me the least important issue here as far as Congress is concerned. What is concerning to me is the politicization of the NRC——

Mr. JACZKO. And I do not believe the agency——

Mr. SIMPSON. By this decision, and I think it is, and I do not think there is any way you can look at the record and not come to that conclusion when you look at delaying this vote for, how long now——

Mr. JACZKO. Congressman——

Mr. SIMPSON. When you clearly have procedures under appendix 5 of the resolution of a two to two vote, and if it is three to one or four to zero, you have met the precondition that you set when you said when you have a majority opinion.

Mr. JACZKO. Congressman, as I said, I am following the procedures of the commission and, again, I do not want to go into details because I cannot discuss the details of adjudication.

Mr. SIMPSON. In a memorandum dated March 30, 2010, the NRC staff laid out a scheduled of tentative completion dates for the Safety Evaluation Report volumes——

Mr. JACZKO. Correct.

Mr. SIMPSON. The SERs. This scheduled includes that—indicates that each of the volumes will be completed by no later than dates that are shown. Did you, as chairman, issue any direction to the NRC staff, either orally or in writing, which delayed or in any way affected the timing or release of the SER volumes related to Yucca Mountain?

For instance, since there was a no later than date, if the NRC staff was ahead of schedule, did you issue any directions that impacted the staff timing of completion of the public release of these volumes?

Mr. JACZKO. Yes, I did. I indicated to them that they should follow their published schedules in a memo and we can provide that memo to you.

Mr. SIMPSON. If they were ahead of schedule?

Mr. JACZKO. I told them to stick to their published schedules. I do not have the exact memo in front of me and the language, but we can provide that for you.

Mr. SIMPSON. Could you please provide a copy of that?

Mr. JACZKO. Absolutely.

Mr. SIMPSON. A number of members of Congress and committees have written to the NRC requesting release of the full unredacted volume three of the SER for Yucca Mountain. Does the commission intend to provide this document to the committees of Congress?

Mr. JACZKO. We have provided that to Congressman Issa, I believe yesterday.

Mr. SIMPSON. Yesterday? Appreciate it.

Mr. JACZKO. Although I would state for the record that I do not agree that we should provide that document. It is a draft predecisional document and, again, with an ongoing adjudication like this, I have not seen that document. I am not allowed to see it, nor are any other members of the commission allowed to see that document. So, I think it creates a very dangerous precedent for predecisional documents to be—when we have hearing processes ongoing in which this information needs to be established formally on the record, I think it creates a very dangerous precedent for us to provide that information and I did not agree with the commission providing that information.

Mr. SIMPSON. I appreciate the fact that you provided that information. There is a way to avoid that problem, make a decision.

Mr. JACZKO. And, Congressman, as I have indicated, I am not solely responsible for the decisions of the Commission, we function as a body.

Mr. SIMPSON. You are responsible for scheduling the vote.

Mr. JACZKO. That is not true. Voting matters go to the entire Committee. I propose an agenda to the Commission, that agenda needs to be approved by the full Commission. Any of our particular sessions in which we actually vote on matters require a full Commission and require a majority of Commissioners to move forward. I do not and have not exercised the authority independently to schedule a vote or not schedule a vote. Again, that is the procedures of the agency that we have.

There is, in my mind, some outstanding question of whether or not I would have that authority, but it is not an authority that I have exercised in this particular case. And again, beyond that, I do not intend to go into the matters under adjudication in discussion.

Mr. SIMPSON. I appreciate you being here today. I am sure we will be back, and I am sure you will be back before the Energy and Commerce Committee and the Government Reform Committee, because there are real concerns within Congress. As I said, those concerns extend much beyond Yucca Mountain, to the direction that the NRC is taking, and we believe the direction that it is taking beyond the law, and I would check the graduation records of that attorney that is advising you. Thank you.

Mr. JACZKO. Well, Congressman, I would just like to say for the record, if I may, that I have very strong confidence in the General Counsel about the Nuclear Regulatory Commission, and I appreciate you may have differences of opinion about that. Those are certainly matters that the courts will deal with at some point, I suppose, but I do not think that the General Counsel is at all at fault here, and I would just like to state that for the record.

Mr. SIMPSON. Then it only falls back on one person.

Mr. JACZKO. Well, I take full responsibility for the actions of this Commission. And as I said, I am very comfortable with the decision we have made. And, in fact, I believe that that was a very apolitical decision, and it was an important decision. It was a difficult decision, absolutely, but we are a regulatory body, it is not the responsibility of this body to require the DOE to move forward or not move forward with a particular program or a program direction. Our job is licensing, that is the function and responsibility of this body. No more than you would expect the Fire Marshall to go in and tell a developer to continue developing a building so that they can conduct their fire inspections should we be expected to be in the position of demanding or requiring the Department of Energy to move forward with a program.

I believe that that is a very important principle that is at stake here, and it is important for the independence of this agency that we continue to be able to make decisions absent——

Mr. SIMPSON. The question before the Commission was whether the DOE could unilaterally withdraw the license application, that was the question before the Board.

Mr. JACZKO. And that——

Mr. SIMPSON. And they said, because Congress has a say in this, that Congress and the Nuclear Waste Policy Act determined that Yucca Mountain was the spot. Whether that was a sound or scientific decision or not, it seems to me that the Department, if they do not believe this is the right thing to do, needs to come to Congress and say this is why we have changed our mind, we have found out that this is not safe or this is not the right place to put it or politically it is not the right thing to do, and get a vote of Congress. This should not be a unilateral action by the administration to secure four electoral votes, and we all know that is exactly what it was. And I just wanted to show you something that is going to be very famous. This is the coin put out by the DOE on submission of the Environmental Impact Statement for Yucca Mountain in 2008. Hopefully one day it will be worth something. Any other questions?

Mr. PASTOR. Yeah, I just would like to make a comment. In the 2010 budget that was adopted, H.R. 3183, Appropriations for the Energy and Water Development and Agencies Related, we appropriated money for the Blue Ribbon Commission, and in that law, we said that the five million shall be provided to create a Blue Ribbon Commission to consider all alternatives for nuclear waste disposal, not sites, but to consider all alternatives.

And we felt that we were going at least—that we were going halfway with the Administration, that we were cooperating with the Administration and said, all right, have the Blue Ribbon Commission, here is the money, but I think there is enough record to say, in your deliberations, in your consideration, Yucca Mountain should also be part of the mix.

And DOE basically told us no way, it is a siting, we are not doing siting. Well, we understand you were not doing siting. We said, as you consider all alternatives for nuclear waste disposal, I do not know how many billions, that this be also considered. But DOE just basically, you know, said BS to you guys. And so first of all, you had the argument of whether you could do it unilaterally, and then everything that has gone with that, but then when we make a request and cooperation, you basically said go to hell. And so I have got to tell you that you are still going to have push back with Yucca Mountain, it is probably going to be a bipartisan effort, at least for some members, because we felt that—and I'm sure that your counsel, and I am not going to argue about your legal counsel, but I always felt that—as Dr. Lyons said, there were technical reasons and public support reasons, and the technical reasons were not given, but the public support was enough to pull it out.

I am saying that was a big investment, and we tried to cooperate by saying we will give you the $5 million to create this Blue Ribbon Commission, and we just asked you to consider alternatives for nuclear waste disposal, and you basically told us go to hell, and I think that has rubbed many members in the wrong way, and I am sorry to say that we went that way.

Mr. JACZKO. Mr. Pastor, you essentially gave the only answer that I think I could have given, that the BRC is not a siting Commission, so they are not considering a specific site.

Mr. PASTOR. We did not ask you to site. You decided to define "alternatives" as siting. You decided, we did not decide. We asked you to look at all alternatives. And as a way to get around this law, you decided to make it a siting issue. So I am not arguing that it was a siting, I am arguing that it was looking at all alternatives. You decided to get around the law by saying it is a siting problem, and so it was not me, it was you. And again, you had to find a rationale, you could not find a technical reason, you said, well, it is lack of public support, and the Blue Ribbon Commission, in the eyes of the Department of Energy, is a siting commission. You made that determination, not me, not the Subcommittee, not Congress, it was you who made that decision to claim it was a siting decision.

Mr. SIMPSON. Mr. Olver.

Mr. OLVER. I hesitate truly to get into this point. Where is this housed in the government? We do not have a siting commission.

Mr. PASTOR. We do not have a siting commission, we have a Blue Ribbon Commission. The Blue Ribbon Commission does what?

Mr. LYONS. The Blue Ribbon Commission is charged with evaluating and making recommendations on the back end of the fuel cycle.

Mr. OLVER. And where is this Blue Ribbon Commission housed? Is it in the Department of Energy? Where is it in the government?

Mr. LYONS. It is very much an independent commission. We are—we are providing—well, with the funds that you provided, we are providing funding to the BRC, yes.

Mr. OLVER. Dr. Lyons, you pointed out that you agree with the decision to terminate Yucca Mountain. I do not know whether it is dead forever or not, I almost do not care either especially, except that for all these years, we have been creating the waste, we have been trying to figure out where to put the waste, what to do with the long term waste and creating more of it, and you are coming in with a budget which intends to create even a whole lot more waste. Somebody has a responsibility to deal with this, and I am not sure where the responsibility is at this point, but you, Dr. Lyons, Secretary Lyons, you say that you agree with that decision. What responsibility is DOE trying to take—or willing to take, if any, to try to figure out where this waste is going to go?

Mr. LYONS. The Department clearly recognizes that it has the responsibility for the management of the used fuel. At the moment——

Mr. OLVER. But it is being stored in large measure at the sites of the nuclear plants, and if we are going to have more nuclear plants, which the policies clearly require there to be, whether those are successful or not, we will see along the way, but it took us years and years and years to think about Yucca Mountain, and now it looks as if it is terminated. How long will it take us to deal with all of this waste fuel, with all of its 1 percent of plutonium and remaining amount of fissionable uranium and other actinides and everything else that is there with long half-lives which is going to be growing in volume.

Mr. LYONS. I am not sure if there was a question in there. I mean I indicated that, number one, the Department——

Mr. OLVER. What are you doing? What is the Department of Energy doing to begin to solve that problem, if now you agree with the dissolution of the so called solution, which was Yucca Mountain for some period of time, is now to be taken off the table, what is the alternative?

Mr. LYONS. Well, the statement I made was that I welcomed the opportunity to help the Department find a more workable solution. And I agreed with Secretary Chu that Yucca was not a workable solution. In terms of the programs that we have, I mentioned earlier some of the research programs we have exploring a range of options from the once through cycle all the way through full reprocessing, with a number of options in between, including deep burn, which is one of the very interesting options that may well come through this process. At this point in time, we are within a few months of the Blue Ribbon Commission report. I mean based on the individuals that are on—I am extraordinarily optimistic that the Blue Ribbon Commission will provide very important guidance, first to the Department, and I hope to Congress.

Mr. OLVER. Do you think they will do it or tell us where somebody is going to accept the long term, high radiation nuclear waste?

Mr. LYONS. I think that one area that the Blue Ribbon Commission——

Mr. PASTOR. It is not a siting commission.

Mr. OLVER. Oh.

Mr. PASTOR. It is not a siting commission.

Mr. LYONS. One area that the BRC has evaluated, I know, is experience in other countries. There are very successful programs in other countries that could well prove to be useful models in this country, where, in other countries, they have found ways to build strong public confidence, public interest and public support in repository programs. There may be lessons in there, and I am awaiting the BRC's evaluation of those lessons.

Mr. OLVER. Wow, we are to continue to simply kick this one down the road, are we not?

Mr. LYONS. We have a—July.

Mr. OLVER. All of those were considered at one point or another. We have known what other countries have been able to do and have been willing to do. We want to go to Heaven, but we do not want to die to do it.

Mr. JACZKO. Well, Congressman, if I could just make a point, too, that one of the issues that the NRC focuses on is the safety and security of spent fuel. And the Commission recently reaffirmed our view that certainly for the next—if you take the operating life of the reactors and add about 60 years onto that, that we see no concerns with the safety and security of that fuel, which gets you basically to about 100 years. So there is no——

Mr. OLVER. The safety of the fuel is just being added to, in pools and so forth at the——

Mr. JACZKO. Correct.

Mr. OLVER [continuing]. Most of those pools are full. What are we going to do, build more pools at every one of their nuclear power plants?

Mr. JACZKO. As the pools fill up, you move the fuel into dry cask storage, that is the methodology that has been established. And again, the Commission has looked at this issue and found that basically when you take that 40-year operation of the plants, and again, looking at new plants, as well, that it is safe and secure for at least 60 years beyond the lifetime of the plant, so that is a very long period of time at which to look at——

Mr. OLVER. And you are telling us we do not need Yucca Mountain, are you not?

Mr. JACZKO. I am sorry?

Mr. OLVER. You are telling us we do not need Yucca Mountain?

Mr. JACZKO. At this point, there is a need for a longer term solution, but for the short term, and again, we are talking about decades, multiple decades, there are no safety and security issues with the spent fuel.

Mr. LYONS. I think dry casks——

Mr. SIMPSON. Well, we are kicking the can down the road.

Mr. LYONS. To me, dry cask storage gives us the opportunity to step back, find better, more workable solutions, and that is why I accepted this job.

Mr. OLVER. I want to understand something more about deep burn. And I think if I were able to do that, and also your small modular reactors. I have some real questions, and I do not want to ask them, because I do not think I would use the terms that you would understand, I could not put the terms correctly enough that I would get anything back that I would understand, okay.

Mr. LYONS. I would be happy to meet with you or bring staff to you or your staff to have further discussions on these areas.

Mr. OLVER. Okay, thank you.

Mr. SIMPSON. And let me just say, you know, throughout this discussion, that I am not critical of the Department. I know the Secretary and you are doing what you have to do. I actually support the Blue Ribbon Commission on what they are doing. I think we ought to look at different ways we can deal with this waste, whether we reprocess or other things to reduce the volume. We all know that at some point in time, we are going to have to have a geological repository for the gunk that is left over.

Mr. LYONS. Absolutely.

Mr. SIMPSON. As Mr. Olver said, I think we are kicking the can down the road. But I am not critical of what the Department is doing in this regard. I understand what you are doing and why you are doing it, and I look forward to the Blue Ribbon Commission's work and what their recommendations are. I am real critical of what the NRC is doing, because I think they are overstepping the bounds of the law. And so this is a subject we will follow up with, I am sure, in further hearings, in a variety of committees before Congress.

I appreciate, you know, in spite of all of that, I do appreciate what you do and the tasks you have. It is a difficult job right now, particularly in light of events around the world, and we look forward to working with you on this budget to try to make sure that it advances the cause of nuclear energy in this country, and thank you for being here.

Mr. LYONS. Thank you.

QUESTIONS FOR THE RECORD

SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

NUCLEAR REGULATORY COMMISSION
AND
DEPARTMENT OF ENERGY'S NUCLEAR ENERGY PROGRAMS
FISCAL YEAR 2012 BUDGET HEARING

MARCH 31, 2011

FUKUSHIMA POWER PLANT IN JAPAN

IMPACT OF EVENTS IN JAPAN ON NUCLEAR INDUSTRY

Subcommittee. As I mentioned in my opening remarks, the earthquake and tsunami have created a terrible tragedy for the people of Japan, and our thoughts are with them. I'd like take a moment to discuss with you, Dr. Lyons and Chairman Jaczko, what impact you believe the events at the Fukushima Daiichi nuclear plant in Japan is having—or might have—on the nuclear industry in the United States and abroad.

Given that nuclear power is and will play an important role in our energy mix, how do you think these events might impact your programs and the nuclear industry in the short-term? And how—if at all—might it impact where we're heading in the long-term?

Dr. Lyons. Nuclear power will continue to be an important part of our energy mix along with renewable sources like wind, solar, natural gas and clean coal. Nuclear power currently supplies nearly 20% of our domestic electricity needs and since electricity demand is projected to grow significantly, we need to ensure those future demands are met with an efficient, affordable, climate-friendly supply.

Our fleet of nuclear power plants has undergone exhaustive study and had been determined to be safe for any number of extreme contingencies. However, the Administration has a responsibility to learn from the types of events that are happening in Japan and to draw from those lessons to ensure the safety and security of the American public. With this in mind, short-term actions include the comprehensive review of the safety of our domestic nuclear plants being undertaken by the Nuclear Regulatory Commission (NRC). NRC will look closely at all aspects of response of the plants to the earthquake and tsunami to determine if any actions need to be taken in the current fleet of nuclear plants as well as changes that need to be made in future designs and if any changes are necessary to NRC regulations.

The U.S. nuclear industry sets the highest standards for safety and, through their focus on continuous learning, will incorporate lessons learned from the events in Japan into the ongoing process of regulating and overseeing our fleet of existing plants and designing, licensing, and building new nuclear power plants.

Mr. Jaczko. The NRC has launched a two-pronged review of U.S. nuclear power plant safety in the aftermath of the March 11 earthquake and tsunami and the resulting crisis at the Japanese Fukushima Daiichi nuclear power plant. The NRC established a task force, made up of current senior managers and former NRC experts with relevant experience, to conduct both short- and long-term analysis of the lessons that can be learned from the situation in Japan. The NRC will perform a systematic and methodical review, examining all available information from Japan, to see if there are changes that should be made to programs and regulations to ensure continued protection of public health and safety. An aggressive schedule has been established for the task force to provide formal updates to the Commission on the short-term effort in 30, 60 and 90 days.

As discussed in Information Notice 2011-05, dated March 18, 2011, the nuclear power industry has begun taking the following actions at each licensed reactor site:

1. verification of the capability to mitigate conditions that result from severe adverse events, including the loss of significant operational and safety systems due to natural events, fires, aircraft impact and explosions
2. verification of the capability to mitigate a total loss of electric power to a nuclear power plant
3. verification of the capability to mitigate flooding and the impact of floods on systems inside and outside the plant
4. identification of the potential for loss of equipment functions during seismic events appropriate for the site and the development of mitigating strategies to address potential vulnerabilities

The NRC has also issued two Temporary Instructions (March 23, and April 29) to provide guidance to our inspectors on activities that the NRC would like them to conduct. The first Temporary Instruction was focused on independently assessing the adequacy of the actions that licensees had taken in response to the Fukushima event (such as responding to large fires, and explosions; responding to station blackouts and flooding events). Inspection reports associated with these activities affirm that every plant has the capability to effectively cool down reactor cores and spent fuel pools following such events. The second Temporary Instruction was associated with looking at severe accident mitigation guidelines (SAMGs). These guidelines were put in place in the 1990s and were voluntary industry initiatives. In order to assist the task force in their effort, the NRC instructed inspectors to review the adequacy of these SAMGs, and how they've been maintained over the years.

On May 11, 2001, the NRC also issued a Bulletin to the nuclear power industry requesting information on what our licensees have done to implement strategies to respond to large fires and explosions. Following September 11, 2001, the NRC issued a series of orders requiring licensees to take a set of actions to respond to large fires and explosions beyond the design basis of the plant. We subsequently codified these orders in a series of regulations which have been inspected over time. However, the NRC wanted to go back and check again to make sure we understood clearly what licensee had done. We are asking our licensees to verify that equipment and staff are capable of performing all required actions, and provide us information on the maintenance testing, offsite support, and other features that are required.

NRC resident inspectors who are posted at every U.S. nuclear power plant will also support the task force's short-term effort, supplemented as necessary by experts from the agency's regional and headquarters offices. The task force will help determine if any additional NRC responses, such as orders requiring immediate action by U.S. plants, are called for, prior to completing an in-depth investigation of the information from events in Japan. NRC inspectors are also performing independent assessments of the adequacy of the licensee voluntary actions, described above, and to coordinate their inspection efforts with the licensees schedule for verification of plant capabilities.

The longer-term review will inform any permanent NRC regulation changes determined to be necessary. We anticipate this effort will begin about the time the near-term 90 review is completed and provide a report to the Commission with recommended actions within about six months after the start of this evaluation. The Commission plans to hold monthly public meetings on the status of the NRC response to the Japan earthquake and will post the meeting schedule on the NRC's public webpage. At this point, aside from the effort to identify and incorporate lessons learned and improve safety where necessary, it is still too early to tell what the long term impacts of the events in Japan will ultimately have on the direction of the U.S. nuclear industry.

Subcommittee. Of course, there's a question many people are asking while we've been watching Japan struggle with the Fukishima power plant: "If it happened at the Fukushima power plant, could it happen here?" I'd like to take a minute to get your thoughts on that question.

First, I hear disagreement over whether there was a flaw in the reactor design at Fukushima, or whether there was a systems issue—a failure to adequately protect the reactor's auxiliary systems. What is your take on that question, Dr. Lyons and Chairman Jaczko?

Dr. Lyons. Major industrial accidents like that experienced at the Fukushima Daiichi reactors are usually caused by a complex series of events that can be a combination of natural events, human errors, design flaws, equipment failures, and construction errors. It is much too early to determine with any certainty what contributing or root causes beyond the earthquake and tsunami may have influenced the events at Fukushima. This will be learned over time with further investigation.

As noted in response to the following question, we do know that the plant protective systems operated as designed immediately following the earthquake until the emergency diesel generators ceased to operate following the tsunami. The U.S. Nuclear Regulatory Commission will be investigating this issue along with other relevant issues and applying them to the U.S. reactor fleet to determine if there are any corrective actions that need to be taken as a result.

Mr. Jaczko. The events in Japan are still unfolding and until we the full set of details of what happened (i.e., how systems, equipment, and personnel responded), it is still too early to say with any level of confidence that there was a flaw in the reactor design or that there were issues of inadequate protection. What we believe, based on the information available, is that the units at Fukushima Daiichi responded to the earthquake as they were designed to respond (i.e., reactor shutdown and automatic start of emergency diesel generators upon loss of offsite power). We have also learned that the emergency power systems, with the exception of the back-up batteries, were swamped by the tsunami, which exceeded the level of protection provided by the facility. Loss of the emergency power systems exacerbated the situation and as the batteries began running out, the situation continued to get worse. It has been reported that the tsunami that hit Fukushima Daiichi was in excess of the design basis tsunami for that facility.

The design of a nuclear power facility is typically thought of in terms of the nuclear island (i.e., the reactor and its connected systems, including the containment buildings) and the balance of plant (i.e., secondary cooling water systems, electrical and emergency power systems, etc.). Even though the reactor design at Fukushima Daiichi (i.e., BWR Mark I) has operated without significant incident for many years in both the U.S. and abroad, some improvements have been required of this design in the U.S. In addition, there are differences in design of the balance-of-plant systems due to site-specific factors and the use of different architect/engineers and constructors for these portions of the plant. The variability that occurs in the designs of the balance-of-plant systems at these facilities also makes it difficult to conclude that there were design flaws or inadequate protection.

Subcommittee. I understand that the United States has nuclear reactors of the same "make and model" as the Fukushima Daiichi reactors—six U.S. reactors have the same reactor and secondary containment structure designs, I believe. Do our plants have the same safety risks as Fukushima, or are there regulatory differences, construction differences, and other precautions that make our plants safer?

Dr. Lyons. When the earthquake on March 11 struck, the three operating reactors at Fukushima Daiichi Nuclear Plant (Units 1, 2, and 3) shut down in accordance with operating procedures. Backup diesel generators started per procedures to keep the water pumps and instrumentation operational. But when the earthquake-generated tsunami struck, those backup power generators were damaged and Units 1-3 lost all offsite power and emergency diesel generators. This situation is called "station blackout." U.S. nuclear power plants are designed to cope with a station blackout event that involves a complete loss of offsite power *and* onsite emergency power. U.S. nuclear plants are required to maintain the plant in a safe condition during a station blackout scenario. Many U.S. nuclear plants installed battery systems that can operate some plant equipment for up to 72 hours. Several plants added additional AC power sources to comply with this regulation.

In addition, since the terrorist events of September 11, 2001, U.S. nuclear plants are designed to mitigate severe accident scenarios such as aircraft impact, which include the complete loss of offsite power and all on-site emergency power sources.

U.S. nuclear plant designs include consideration of seismic events and tsunamis. It is important not to extrapolate earthquake and tsunami data from one location of the world to another when evaluating these natural hazards. These catastrophic natural events are very region- and location-specific, based on tectonic and geological fault line locations.

Mr. Jaczko. Thirty-five of the 104 operating nuclear power plants in the U.S. are boiling water reactors (BWRs), as are the reactors at Fukushima. Twenty-three of the U.S. BWRs have the same containment design (i.e., Mark I) as the Fukushima Daiichi reactors. Four of the U.S. BWRs are early designs, which are similar to Fukushima Unit 1. Nineteen U.S. BWRs are similar to Fukushima Unit 3.

That being said, all U.S. nuclear power plants are built to withstand the external hazards, including earthquakes, flooding, and tsunamis, that are appropriate for its region. Even those plants that are located in areas with low and moderate seismic activity are designed for safety in the event of such a natural disaster.

The NRC is not aware of all of the differences that may exist between the reactors that are of similar design and vintage as those operated in the U.S. The NRC can only comment on its own regulatory approach and does not have any comments on or detailed knowledge of specific requirements in the Japanese regulatory approach. However, many improvements have been made to U.S BWRs. For example, NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," conveyed the importance of having a robust pathway for venting primary containment, which contains the suppression pool, in certain severe accident scenarios. In response, all BWRs with Mark I containments that didn't have an existing strengthened or "hardened" pathway for venting directly from primary containment to the outside, made modifications to the plant consistent with the intent of the Generic Letter. This feature is designed to permit a controlled depressurization of primary containment, as well as a controlled release of radioactive materials and combustible hydrogen generated by damaged fuel, as may occur during severe accidents.

The NRC regulatory approach requires that facilities be designed to cope with a station blackout for specifically analyzed durations, include measures to control combustible gases, and include programs, procedures and equipment to maintain or restore core cooling, containment, and spent fuel cooling capabilities under circumstances associated with loss of large areas of the plant due to explosions or fire. Licensees of U.S. nuclear power plants have also implemented the use of severe accident management guidelines to respond to severe accident events. Although the reactor portions (i.e., nuclear steam supply system) are primarily the same, some differences in the design and construction of these BWR plants exist also because of site-specific factors and the use of different architect/engineers and constructors.

Subcommittee. What about hydrogen venting? Do our reactors have different venting systems or other precautions that would prevent the hydrogen explosions that affected some of the outer containment building at Fukushima?

Dr. Lyons. In the 1980s, analyses of severe accident conditions indicated the benefit of "hardened" vents in the suppression pools of Mark I containments. These would vent hydrogen, steam, and other airborne material from containment to reduce the pressure in containment following a severe accident. Hardened vents refer to the fact that these are high strength vents routed away from the reactor building through filters to the main plant vent stack. Plant operators in the United States evaluated their designs and added these hardened vents or demonstrated that that capability already exists.

Information on the sequence of events and the exact configuration of systems and equipment at the Fukushima reactors are still being learned and will be for quite some time. There have been conflicting reports as to whether the Fukushima reactors had hardened vents and if these vents are of the same design as those in similar U.S. reactors. The design and installation of systems such as these could vary in significant ways from plant to plant. There are also preliminary reports that fans used to direct the hydrogen through the vents may have stopped when the emergency diesel generators failed and other vent paths may have allowed hydrogen to accumulate at the top of the reactor building where it then exploded. The U.S. Nuclear Regulatory Commission will study this issue and other important issues when they undertake their investigation of the Fukushima accident and apply lessons learned to reactors in the United States.

Mr. Jaczko. NRC Generic Letter 89-16, "Installation of a Hardened Wetwell Vent," conveyed the importance of having a robust pathway for venting primary containment, which contains the suppression pool, in certain severe accident scenarios. In response, all BWRs with Mark I containments that didn't have an existing strengthened or "hardened" pathway for venting directly from primary containment to the outside, made modifications to the plant consistent with the intent of the Generic Letter. This feature is designed to permit a controlled depressurization of primary containment as well as a controlled release of radioactive materials and combustible hydrogen generated by damaged fuel, as may occur during severe accidents.

Subcommittee. We've talked about our current reactors, but what about the new class of reactors that are just starting construction in the United States? Are those "Gen III+" reactors safer than the Fukushima Daiichi reactors? Can you explain the safety advantages?

Dr. Lyons. The new light water reactor designs are being designed to be even safer than the current fleet of reactors since they make use of passive safety features or add additional redundant safety systems. Passive safety features rely on natural forces (such as gravity) rather than engineered safety features (such as mechanical pumps) to deliver cooling water to the reactor core and remove heat from the primary containment. Most of the newer plant designs planned in the U.S. incorporate passive safety systems in which natural circulation replaces recirculation pumps; the number of plant systems and building volumes are reduced; and there are fewer operator actions required in the event of an emergency. In the event of an emergency involving loss of offsite power, both the Economic Simplified Boiling Water Reactor (ESBWR) and AP1000 designs are designed to automatically maintain reactor core and spent fuel pool cooling for at least 72 hours with no offsite power or emergency diesel generators required; whereas the batteries in Japan only lasted a few hours. In addition, these designs utilize passive systems to capture hydrogen gas and convert it to water without the use of any electrical power. The ESBWR also incorporates advances from the Advanced Boiling Water Reactor (ABWR), which replaced the older technology in use at Fukushima Daiichi. The ABWR design includes safety enhancements such as a water makeup system that doesn't require AC power. Finally, a number of companies are moving forward with small modular passively safe reactors that incorporate features such as integral design for major components and subsurface construction that may provide an additional margin of safety.

Mr. Jaczko. The NRC has not completed any study that would compare the safety of the "GEN III+" reactors to the safety of the Fukushima Daiichi reactors. However, the "GEN III+" reactors do contain additional features that are different from the design of the Daiichi reactors and are intended to provide added reliability to system availability or to enhance the safety of the proposed design. "GEN III+" reactors can be divided into two categories – passive designs or evolutionary designs. A couple of examples of the design enhancements for each category are given below.

Passive designs

The most significant innovation of Gen III+ systems over second-generation designs is the incorporation of passive safety features that do not require active controls or operator intervention. Instead they rely on gravity or natural convection to mitigate the impact of abnormal events. For example, the AP1000 is equipped with reactor and containment cooling systems that employ water tanks, which can be emptied into the reactor vessel and into containment to flood in and around the reactor vessel. These systems provide cooling such that the reactor will remain in a safe condition for 72 hours without any external power or significant operator actions.

Another system advantage in some GEN III + designs is the use of a passive isolation condenser system. The ESBWR has a passive isolation condenser system that will remove heat from the reactor after it is shut down with no electrical power. Combined with its passive containment cooling system that removes heat from the containment, the system permits 72 hours of no operator actions and no external power for the power plant to remain in a safe mode. Additionally, part of the passive system is a gravity-driven cooling system which provides return water to the reactor core.

Evolutionary Designs

Evolutionary designs contain increased redundancy to existing reactor designs. For example, the EPR and USAPWR designs provide additional trains of both emergency AC power and emergency core cooling to enhance the availability and reliability of essential safety systems. Specifically, the major safety systems consist of four trains (instead of the current designs that provide only 2 full capacity trains), each capable of performing the entire safety function on its own. Each safety system is physically separated from the others and they are located in separate parts of the plant and have their own protection features. This reduces the likelihood of simultaneous failure of all the safety systems due to internal or external events, such as fire, flooding or airplane crash.

Another example is the use of containment refueling water storage. In the refueling water storage tank, which is the water source for the emergency core coolant system, is located outside the containment vessel. Its location makes it vulnerable to loss or damage from natural phenomena such as earthquakes, tornadoes, floods, etc. The placement of the refueling water inside containment effectively minimizes the potential for loss of this essential water source for core cooling. It also provides another heat and pressure removing feature for the containment to mitigate the potential for overpressurization of the containment building.

Finally, all the "GEN III+" designs contain some design features to mitigate a postulated severe accident such as core melt either by flooding the reactor cavity space immediately surrounding the reactor vessel with water to submerge the reactor vessel or by providing some form of core spreading devise, commonly referred to as a core catcher so that substantial releases of radioactivity are mitigated.

Subcommittee. Is the next generation of reactor designs beyond Gen III+, like small modular and high temperature gas reactors, even safer? What would make them safer?

Dr. Lyons. Yes, we anticipate that they will be. Improvement in safety has been a key driver in the development of these new designs. The new SMR designs based on light water technology that are the closest to commercialization share a common set of design principles to enhance plant safety and robustness beyond the Gen III+ designs. These principles include:

- Vessel and component layouts that facilitate natural convection cooling of the core and vessel, and do not require external power to sustain long-term cooling;

- Incorporation of primary system components into a single vessel, eliminating large loss of coolant accident scenarios;
- Smaller cores and more effective decay heat removal;
- Increased ratio of cooling water to heat output in the primary reactor vessel;
- Below-grade construction of the reactor vessel and spent fuel storage pool, providing additional protection from man-made or natural phenomena hazards; and,
- Enhanced resistance to seismic events.

In regards to other reactor concepts that may be commercialized in the next 10 to 15 years, certain high-temperature gas-cooled rectors (HTGRs) are being designed to incorporate several advanced safety features including passive decay heat removal systems and coated fuel particle that retain fission products under even the most severe accident conditions.

More advanced designs such as metal and molten salt-cooled technologies, which have a longer time horizon for commercialization, may offer features that provide even more safety margin, including:

- Low pressure coolants to reduce generation of steam (and pressure build up) during loss of forced circulation accidents;
- More robust fuel forms that can survive extreme temperatures;
- Higher burnup fuels that can reduce the volume of discharged fuel stored on-site;
- Advanced cladding and structural materials that survive extreme temperature conditions; and,
- Strong negative reactivity coefficients to assure safe shutdown.

Mr. Jaczko. The Nuclear Regulatory Commission's Advanced Reactor Policy Statement (73 FR 60612) sets an overall Commission expectation "that advanced reactors will provide enhanced margins of safety and/or use simplified, inherent, passive, or other innovative means to accomplish their safety and security functions." The Policy Statement describes attributes of such designs, including "Designs that minimize the potential for severe accidents and their consequences by providing sufficient inherent safety, reliability, redundancy, diversity, and independence in safety systems, with an emphasis on minimizing the potential for accidents over minimizing the consequences of such accidents."

Recently-proposed reactor designs claim to fulfill these expectations by providing simpler systems with increased passive cooling capabilities. However, since formal applications with detailed design information are not expected to be submitted to the NRC until at least the end of calendar year 2012 for review, it is premature to make definitive statements about these designs. While promising, the designers' claims must be verified through detailed review by the NRC staff, that will include full consideration of lessons learned and insights from the Japanese earthquake and tsunami.

COOPERATION WITH NUCLEAR REGULATORY COMMISSION

Subcommittee. What are the obstacles to effective cooperation on licensing and safety oversight between the Department and the Nuclear Regulatory Commission?

What is being done to remove those obstacles?

Dr. Lyons. No major obstacles to effective cooperation exist between the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). The DOE and NRC coordinate closely on a variety of issues related to reactor licensing and safety oversight while assuring that our distinct missions and responsibilities are never compromised.

We are collaborating on licensing of large light water reactors, high-temperature gas-cooled reactors under the Next Generation Nuclear Plant (NGNP) Demonstration Project, and on Small Modular Reactors. As a specific example, the Department is currently engaged with the NRC and the Nuclear Energy Institute on licensing initiatives that will support the deployment of Small Modular Reactors (SMRs) by recognizing unique design features of those reactors and their smaller size. The Department and the NRC engage in ongoing discussions, participate together in various forums and draw upon close professional relationships of senior leaders at each agency. The Department is working with the NRC on high-temperature gas-cooled reactors using the existing NGNP Memorandum of Understanding and plans to establish additional MOUs to further enhance cooperation.

Mr. Jaczko. Given our separate and independent missions, we do not see any obstacles to effective cooperation with the Department of Energy. The Nuclear Regulatory Commission and the Department on Energy were established by the Energy Reorganization Act of 1974. Prior to that, the functions that the newly created NRC and DOE were to perform were carried out by the Atomic Energy Commission (AEC). The NRC took over the regulatory functions formerly carried out by the AEC and began operations in January 1975. The NRC and DOE, as well as many other U.S. government and private entities, are cooperating to provide support to the Japanese government and the U.S. Ambassador in response to the earthquake and tsunami and the events at the Fukushima Daiichi facility.

In the Energy Policy Act of 2005, Congress directed the DOE and the NRC to develop a licensing strategy supporting the Next Generation Nuclear Plant (NGNP) program, including research and development activities needed to demonstrate the safety of the proposed reactor. The strategy described in an August 2008 report to Congress described a risk-informed, performance-based approach to develop a combined license application pursuant to NRC's regulations in 10 CFR Part 52. As this strategy is executed, DOE and NRC staffs routinely discuss project activities, plans, and correspondence associated with the NGNP project to ensure consistent understanding of project activities and status, and to ensure alignment of respective agency activities.

In cases where NRC licensing and/or oversight of DOE facilities is sought, these types of co-operative arrangements involve policy level discussions at the Commission and may also involve legislation, as in the case of the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site in Aiken, SC. Another example of cooperative effort between the NRC and the DOE is the Department of Homeland Security National Response Framework, Nuclear/Radiological Incident Annex, which defines the roles and responsibilities of several government agencies in response to incidents involving release of radioactive materials.

SEISMIC SAFETY AT INL ADVANCED TEST REACTOR

Subcommittee. Dr. Lyons, following the situation in Japan, the NRC has announced a review of all commercial nuclear power plants.

Is DOE taking similar steps, such as seismic analysis of the Advanced Test Reactor?

Do you anticipate the need for additional funding to complete these necessary actions?

Dr. Lyons. On March 23, 2011, the Secretary of Energy signed a Safety Bulletin, "Events Beyond Design Safety Basis Analysis," requiring specific actions to be completed at certain DOE facilities, including the Advanced Test Reactor (ATR), in response to the devastating earthquake in Japan. Those actions required a review of existing analysis, confirmation of operability of safety systems and emergency equipment, and confirmation of emergency plans and procedures that address beyond design basis events, including severe seismic events. The actions from the Safety Bulletin will be completed by April 14, 2011 for the Advanced Test Reactor. Also, as part of the on-going ATR life extension program, the Idaho National Laboratory previously performed a seismic assessment of the ATR that identified five modifications of varying complexity that would provide an even more improved ATR defense-in-depth posture for certain seismic events.

LIGHT WATER REACTOR SUSTAINABILITY PROGRAM AND LIFE EXTENSION

Subcommittee. Dr. Lyons, the Light Water Reactor Sustainability program has focused on science and engineering that can extend the operating life of our current reactors and enable further improvements in power output.

Is there room to focus part of the sustainability program's research on safety upgrades on our existing plants?

Dr. Lyons. We will be actively involved in reviews of the situation in Japan and the applicability of lessons learned to the existing U.S. commercial nuclear fleet. If, based on these reviews, additional research is needed on safety upgrades to existing plants, we will work with industry and the Nuclear Regulatory Commission to to determine how best to execute the needed R&D.

NUCLEAR REGULATORY COMMISSION

ELIMINATION OF THE INTEGRATED UNIVERSITY PROGRAM

Subcommittee. Dr. Lyons and Chairman Jaczko, the budget requests for both of your agencies eliminate funding for the University Program, which this Subcommittee has funded in the past to support a pipeline of nuclear engineers and scientists coming out of American universities.

With the American nuclear engineer workforce nearing a time of high retirements and the pipeline of graduating students still not growing sufficiently to fill the spots, why have you eliminated the University Program—especially given our need to keep our reactors safe both now and in the future?

We have heard that only a small portion of nuclear engineers currently go to work for industry. Given that, why do you believe that industry will fill in financial support in place of these university programs, as stated in the Department of Energy's budget request?

Mr. Jaczko. The NRC supports the fiscal year (FY) 2012 budget request as the best use of limited resources.

LAWSUITS AGAINST THE U.S. GOVERNMENT

Subcommittee. Chairman Jaczko, there was a time when the NRC was seen as a reasoned, non-political safety and technological regulatory body. Now, it seems as if your actions are generating more and more lawsuits. For instance, your decision to allow spent nuclear fuel on-site for 60 years is one of the recent court challenges you're facing. I know of at least three states which are suing the NRC over this.

There are at least two other cases pending against the government specifically because of the Administration's attempts to shut down Yucca Mountain– one to stop the collection of Nuclear Waste Fund fees, and another to show that the Department of Energy doesn't have the authority to remove the Yucca Mountain license application…as was confirmed by the NRC's own Atomic Safety and Licensing Board panel.

How many lawsuits is the U.S. government defending against, resulting from the government's failure to assume responsibility of spent nuclear fuel or otherwise resulting from the Administration's attempts to shut down Yucca Mountain?

Mr. Jaczko. The NRC is involved in four such lawsuits (consolidated) pending before the United States Court of Appeals for the District of Columbia Circuit. Those suits chiefly challenge Department of Energy actions to withdraw the Yucca Mountain license application, but three of the cases also name the NRC as a party. There are in addition multiple lawsuits pending before the United States Court of Federal Claims where plaintiffs seek damages from the United States for failing to meet the 1998 statutory deadline to complete a high-level waste repository. The NRC is not a party to those cases and is not directly involved in them. The Department of Justice or the Department of Energy would have detailed information on the Federal Claims Court litigation.

Subcommittee. How much funding is in the fiscal year 2012 budget request for the NRC and other U.S. government agencies for legal fees and/or damages resulting from these or expected cases? What are your estimates for future years?

Mr. Jaczko. The NRC has made no budget request "for legal fees and/or damages from these or expected cases." The pending Yucca

Mountain-related lawsuits involving the NRC seek no legal fees or damages. NRC is not directly involved in the pending litigation in the United States Court of Federal Claims seeking damages from the government.

NRC ACTIONS RELATED TO JAPAN

Subcommittee. Chairman Jaczko, what is the NRC doing to support efforts in Japan to stabilize and secure the damaged nuclear plants?

Mr. Jaczko. It is very important to note that the NRC's role in supporting the efforts to stabilize and secure the damaged reactors in Japan has been just one part of a U.S. government-wide effort, and that the NRC is closely coordinating its efforts with the White House, DOE, DOD, USAID, and others.

The NRC has supported the U.S. government's effort to provide whatever support is requested by the Japanese government. Since March 11, 2011, NRC staff throughout the agency have supported the U.S. government's response, including staff dispatched to the U.S. embassy in Tokyo. The NRC has been working through the U.S. Ambassador as a focal point for Japanese requests for equipment needed to cool the reactor fuel. This includes such things as pumps, fire hoses, portable generators, and diesel fuel. The NRC is also coordinating with General Electric, which has the plant's design specifications, to ensure any equipment provided will be capable of meeting the needs of the Japanese.

The NRC activated its headquarters-based Operations Center on March 11, 2011, in response to the events at Fukushima Daiichi. The Operations Center was fully staffed, and began to gather and examine all available information as part of the effort to analyze the event and understand its implications for both Japan and the United States. On May 16, 2011, due to the conditions at Fukushima Daiichi have slowly stabilized, and the Japanese continue to implement their recovery plan, the NRC determined it will exit the "monitoring mode" and transition its response to the Japanese nuclear emergency from its 24-hour Operations Centers to the Office of Nucear Reactor Research.

Subcommittee. The NRC announced last week the formation of a task force to conduct both a short- and long-term analysis of the lessons we can learn from the events in Japan. Realizing that we don't yet have all the information on Japan or the task force's recommendations, what types of short-term changes to your regulatory framework do you think are possible? What about long-term changes?

Mr. Jaczko. Because we don't yet have the full details on the events in Japan, or the task force's recommendations, it is difficult to speculate on the results of the task force's efforts. However, the areas that the near-term review is investigating are likely the areas that would be involved in any changes to our regulatory framework. Specifically, the areas of investigation that the near-term review is focusing on include the ability to protect against natural disasters (eg, flooding, and seismic), response to station blackouts, severe accidents and spent fuel accident management, radiological consequence analysis, and emergency preparedness issues.

To the extent that changes are identified during the near-term review to the areas mentioned above, the NRC staff will develop recommendations, as appropriate, for enhancements to inspections procedures and licensing review guidance, and will recommend whether generic communications, orders, or other regulatory requirements are needed.

The NRC's longer-term review will begin as soon as the NRC staff has sufficient technical information for the events in Japan, with a goal of commencing no later than the completion of the 90-day near-term report. The task force will evaluation all technical and policy issues related to the events to identify any potential research, generic issues, changes to the reactor oversight process, rulemakings and modifications to the regulatory framework.

Subcommittee. Will the NRC continue processing existing license applications while the task force conducts its analysis?

Mr. Jaczko. The NRC is currently processing existing applications for new licenses and license renewal applications in accordance with the schedules that have been established. The NRC continues to believe that its regulatory framework and requirements provide for a rigorous and comprehensive license review process that examines the full extent of siting, system design, and operations issues of nuclear power plants. The recommendations of the NRC's task force that was established to examine lessons learned from the events in Japan certainly will be taken into account in the NRC's review of these applications, as appropriate. Further, the NRC has the necessary regulatory tools to require changes to existing licenses or applications for certification should the agency determine that changes are necessary.

Subcommittee. How will the task force's timeline of 90 days for its short-term analysis and approximately six months for its long-term recommendations impact existing license applications?

Mr. Jaczko. The NRC is continuing to process existing applications for new licenses and license renewal applications in accordance with the schedules that have been established. The NRC continues to believe that its regulatory framework and requirements provide for a rigorous and comprehensive license review process that examines the full extent of siting, system design, and operations issues of nuclear power plants. The recommendations of the NRC's task force that was established to examine lessons learned from the events in Japan certainly will be taken into account in the NRC's review of these applications, as appropriate. Further, the NRC has the necessary regulatory tools to require changes to existing licenses or applications for certification should the agency determine that changes are necessary.

REVIEW OF EXISTING FACILITIES

Subcommittee. Chairman Jaczko, your budget request includes an increase of $13.7 million for oversight of operating reactors. Since you submitted this request, you have been charged by the President to undertake a comprehensive review of all nuclear facilities, and last week the NRC announced a task force whose work I assume represents at least part of this review.

What is the scope of this review? Are enrichment facilities, waste repositories, spent fuel pools, and non-commercial reactors all included?

Mr. Jaczko. The near-term review by the task force established by the Commission will focus on identifying potential or preliminary near-term/immediate operational or regulatory issues affecting domestic operating power reactors of all designs, including their spent fuel pools, in areas such as protection against earthquake, tsunami, flooding, and hurricanes; station blackout and a degraded ability to restore power; severe accident mitigation; emergency preparedness; and combustible gas control. The longer-term review will begin as soon as the NRC has sufficient technical information from the events in Japan, including specific information on the sequence of events and status of equipment during the duration of the event. The task force will evaluate all technical and policy issues related to the event to identify potential research, generic issues, changes to the reactor oversight process, rulemakings, and adjustments to the regulatory framework that should be conducted by the NRC. The applicability of lessons learned to non-operating reactor and non-reactor facilities also will be explored.

Subcommittee. Do you expect that applications for reactor extensions or power uprates will be slowed because of this review? What about new reactor licenses?

Mr. Jaczko. The NRC is continuing to process existing applications for new licenses and license renewal applications in accordance with the schedules that have been established. The NRC continues to believe that its regulatory framework and requirements provide for a rigorous and comprehensive license review process that examines the full extent of siting, system design, and operations issues of nuclear power plants. The recommendations of the NRC's task force that was established to examine lessons learned from the events in Japan certainly will be taken into account in the performance of the NRCs review of these applications, as appropriate. Further, the NRC has the necessary regulatory tools to require changes to existing licenses or applications for certification should the agency determine that changes are necessary.

Subcommittee. How long will it take for you to complete this review? Will the Task Force's anticipated timeframe of six months for its long-term analysis conclude the review?

Mr. Jaczko. As noted in the staff requirements memorandum that established the task force, the Commission expects the near-term review to last approximately 90 days. The Commission has requested status briefings from the task force about every 30 days, with the final briefing providing a culmination of the near-term review. The longer-term review should begin as soon as the NRC has sufficient technical information from the events in Japan, with the goal of commencing no later than completion of the 90-day near term report. We envision that the longer-term review could last up to 6 months. Based on the results of the long-term review, there could be additional analysis and research recommended. It also depends on exactly what we learn regarding the full details of what happened to those reactors in Japan. If you look historically at what the NRC did in response to TMI, the review and analysis effort lasted for an extended period of time. Therefore, it is too early to tell whether this approximate 6-month effort would conclude the review.

Subcommittee. How much funding do you expect this review to cost, and do you expect the 2012 request will need to change in order to accommodate it?

Mr. Jaczko. The cost for both the short and long term lessons review activities is expected to be less than $5M. NRC plans to request a reprogramming of funds in FY 2011 to cover the cost of the reviews. FY 2012 Commission reviews and approved costs may require NRC to request additional resources.

REVIEW OF LICENSES FOR NEW PLANTS

Subcommittee. Chairman, your request for licensing activities for new plants is a slight increase over fiscal year 2010. It looks like your budget would fund two new combined licenses and continued work on new designs and early site permits.

Have your plans changed following the tragedy in Japan?

Mr. Jaczko. The NRC plans with regard to new reactor licensing reviews have not changed.

JAPAN 50-MILE PERIMETER?

Subcommittee. Chairman Jaczko, your role as Chairman of the NRC should be to provide authoritative guidance on nuclear energy issues. It was reasonable that the government turned to you to give some perspective for U.S. plants following the tragedy in Japan. However, you made a few comments which got you cross-wise with the IAEA and the Japanese authorities.

Could you clarify how you developed the "50-mile" evacuation zone for American citizens around the Fukushima plants? Since this is far wider than the 12 mile zone recommended by IAEA and Japanese authorities, your recommendation caused quite a bit of concern and confusion.

What scientific basis did you have for your recommendation?

Mr. Jaczko. The 50 mile evacuation recommendation that the NRC made to the U.S. Ambassador in Japan was made in interest of protecting the health and safety of U.S. citizens in Japan. We based our assessment on the conditions as we understood them at the time. Since communications with knowledgeable Japanese officials were limited and there was a large degree of uncertainty about plant conditions at the time, it was difficult to accurately assess the potential radiological hazard.

In order to determine the proper evacuation distance, the NRC staff performed a series of calculations using NRCs RASCAL computer code (the data from which were made publically available) to assess possible offsite consequences. The computer models used meteorological mode data appropriate for the Fukushima Daiichi vicinity. Source terms were based on hypothetical, but not unreasonable, estimates of fuel damage, containment and other release conditions. These calculations demonstrated that the EPS's Protective Action Guidelines could be exceeded at a distance of up to 50 miles from the Fukushima site, if a large-scale release occurred from the reactors or spent fuel pools.

The U.S. emergency preparedness framework provides for the expansion of emergency planning zones as conditions require. Acting in accordance with this framework, and with the best information available at the time, the NRC determined that evacuation out to 50 miles for U.S. citizens was a prudent course of action, and would be consistent with what we would do under similar circumstances in the U.S.

Subcommittee. You said at the time that your recommendation was based on the "possibility of scenarios that we haven't seen yet." What did that mean, precisely?

Mr. Jaczko. The RASCAL computer modeling was based on data appropriate for the situation associated with the Fukushima Daiichi plant and vicinity, and, as such, were not based a plant/scenario that we had run before. Such an extreme set of circumstances had never been previously contemplated by the NRC staff.

Subcommittee. Last week, the NRC clarified that its 50-mile recommendation was based on a determination that releases from the Fukushima plant "could...possibly exceed conservatively set safe radiation-exposure limits" based on "limited data and conservative assumptions." Since your recommendation was far more conservative than that of the Japanese or IAEA experts, you may have had additional information that they did not have...or, perhaps, you didn't agree with their recommendation. Which was it? What did you know that they didn't, or what specifically did you disagree with?

Mr. Jaczko. Please see answer to Question 9a ("What scientific basis did you have for your recommendation?").

CLAIM THAT THE SPENT FUEL PONDS IN JAPAN WERE EMPTY

Subcommittee. Chairman Jaczko, your claim on March 16 that the spent fuel ponds at Fukushima's Reactor 4 were dry was factually incorrect and caused not a small amount of concern, both within Japan and internationally. What conclusive evidence did you have before you made this claim?

Please submit for the record this evidence, since the information that we are receiving is that because the area was covered with carbon, the pictures were inconclusive.

Mr. Jaczko. During the morning of March 15, 2011, Japanese authorities confirmed that there was a possibility that the fuel in the Fukushima Daiichi Unit 4 spent fuel pool was not being adequately cooled. [Note that the NRC staff was aware that all of the fuel from the Unit 4 reactor had been recently placed in this spent fuel pool to support Unit 4 reactor maintenance]. There was a concern that spent fuel may restart fission reactions spontaneously. During the evening of March 15, 2011, the NRC received confirmation that Unit 4 was experiencing a fuel cladding fire. TEPCO explained that the fuel rods had been exposed and that hydrogen generation in Unit 4 was taking place. Further, it was understood at that time that the roof of the Unit 4 reactor building was damaged, most likely as a result of the hydrogen explosion. The only reasonable explanation for there to be significant hydrogen generation in Unit 4 was overheating of the fuel assemblies in the spent fuel pool.

On March 15, 2011, at 1850 EST, the NRC received confirmation from TEPCO officials that radioactivity readings inside Unit 4 were approximately 30 R/hr, which consequently made it difficult for site personnel to extinguish the Unit 4 fire. On March 16, 2011, at 1716 EST, the NRC received confirmation from TEPCO officials that the walls of the Unit 4 spent fuel pool had collapsed, and water inventory could not be maintained. The significantly degraded status of Unit 4 was further supported by satellite images that were believed to show only the bottom of the Unit 4 spent fuel pool, indicating that all fuel pool walls were indeed damaged. As a result, the NRC believed the spent fuel pool was likely dry (i.e., the fuel was not being cooled), and was uncertain of the pool's structural integrity and whether the pool would hold water if filled.

OVERSIGHT OF NEW FACILITIES

Subcommittee. Chairman, one of the largest increases in your request is for oversight activities of new plants. According to your request, you will need to be inspecting a total of four new reactors expected to be under construction this year, an increase of two over last year.

What are the four reactors you expected to be under construction this year? Have there been any changes to these plans?

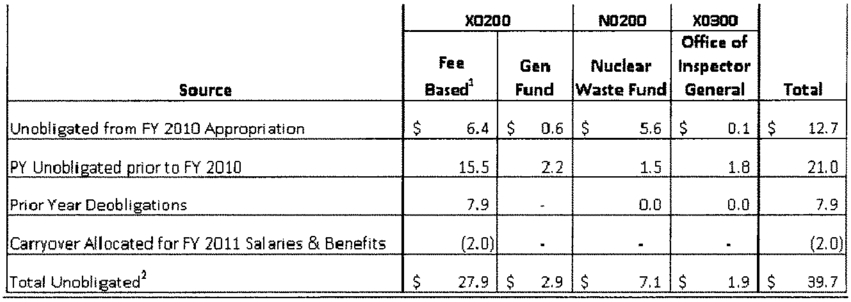
Mr. Jaczko. Summer Units 2 and 3 and Vogtle Units 3 and 4 are the units that NRC expects to be under construction this year, assuming the agency approves their licenses. The applicants have not indicated to the NRC that their construction plans have changed.

CARRYOVER FUNDS

Subcommittee. Chairman, the NRC has in the past carried over significant funding.

What is the estimate of your carryover funds for fiscal year 2010?

Mr. Jaczko.



	X0200		N0200	X0300	
Source	**Fee Based[1]**	**Gen Fund**	**Nuclear Waste Fund**	**Office of Inspector General**	**Total**
Unobligated from FY 2010 Appropriation	$ 6.4	$ 0.6	$ 5.6	$ 0.1	$ 12.7
PY Unobligated prior to FY 2010	15.5	2.2	1.5	1.8	21.0
Prior Year Deobligations	7.9	-	0.0	0.0	7.9
Carryover Allocated for FY 2011 Salaries & Benefits	(2.0)	-	-	-	(2.0)
Total Unobligated[2]	$ 27.9	$ 2.9	$ 7.1	$ 1.9	$ 39.7

[1] NRC's Feebased Funds are 90% recoverable

[2] Total Unobligated includes $24.7M for FY 2011 proposed reprogramming and $1.7M in committed carryover funding.

Subcommittee. Do you think this amount is appropriate? If not, what are you doing to "spend down" the funding to an appropriate level?

Mr. Jaczko. The NRC has made great progress over the last two years to more effectively allocate the resources we receive from Congress, and have significantly lowered our amount of carryover funding.

Subcommittee. Can we expect to see a reprogramming?

Mr. Jaczko. Yes, the NRC currently plans to submit a reprogramming of prior year funds during FY 2011.

CONSTRUCTION FUNDING IN THE REQUEST

Subcommittee. Chairman, it's somewhat buried on page 47 of your budget request, but your New Reactors program has $21 million of "one-time" costs associated with the design, construction, and outfitting of a new headquarters office building. I'm not sure how this is one-time, since there is funding in the FY10 and FY11 requests as well for construction of a new office building.

What is the total is this budget request for construction activities, and how much has already been spent on these activities?

Mr. Jaczko. The Fiscal Year (FY) 2012 budget request includes $21 million to support the design, construction and outfitting of a 14 story headquarters building for the Nuclear Regulatory Commission (NRC). The General Services Administration leased the building to consolidate NRC headquarters staff at a single location. NRC has allocated approximately $46 million to this project through FY 2011.

This new building will allow us to once again reconsolidate our headquarters staff that is currently spread across 5 locations. This new facility will help us carry out our duties more efficiently and effectively, and aid in accomplishing our safety mission.

One of the many lessons learned from the Three Mile Island accident in 1979 was the importance of having staff work closely together to facilitate coordination and effective, timely communications. After the agency's dramatic growth and expansion, the addition of the 3WFN building will once again allow Headquarters employees to work in one central location. This will be more efficient than having staff located at multiple sites throughout the county, and it will support the agency's critical mission to protect public health, safety and people and the environment.

Subcommittee. What is the projected total cost?

Mr. Jaczko. The NRC projected total cost is approximately $79 million. Construction and occupancy of 3WFN will occur in three phases. The first phase will be the excavation and construction of the base building and building systems. This phase began on July 6, 2010. The second phase will be the build out of the interior office and support space. Phases one and two are scheduled to be completed by August 2012. The third phase will be to move in and occupy the building, and is currently scheduled to be complete at the end of 2012.

YUCCA TERMINATION

CONTROVERSY OVER WITHHOLDING FINAL REPORT ON YUCCA MOUNTAIN

Subcommittee. Chairman Jaczko, the President unilaterally shut down the Yucca Mountain project over the protests of the vast majority of Americans – this is likely one of the least "democratic" actions I have seen from an Administration since I have been in Congress.

One of the greatest tragedies is that the Administration's approach is to halt any useful understanding from being gained through the expenditure of over $12 billion in research on the site. Under a Freedom of Information Act filing, your staff recently released a heavily redacted version of Volume 3 of the Safety Evaluation Report...the document which is to show your staff's technological and scientific qualifications of the site. This report should have been released in November, 2010. Now your staff is saying that they're not going to even archive an unredacted version because, as they put it, the information is "predecisional" and could cause confusion.

Chairman, this report was due months ago. Why has no decision been made?

If I'm to understand correctly, this report is going to be buried because it's predecisional, and the reason it's predecisional is that the Administration killed the program?

Closing down the program before the license application could be approved is shameful enough, but hiding what has been learned betrays the trust of the American people and literally wastes years of hard work and billions of dollars. Chairman Jaczko, what is in this document that the Administration would find so damaging if it were made public? That, perhaps, the site is technically qualified for a million years?

Mr. Jaczko. In October 2010, NRC commenced orderly closure of activities related to review of the Yucca Mountain license application seeking a construction authorization. This action was consistent with the President's Yucca Mountain Budget request for Fiscal Year 11, which the Congress recently approved in the Department of Defense and Full-Time Continuing Appropriations Act for FY 2011. At that time, only Volume 1 of the Safety Evaluation Report had been issued. That volume documents the

Staff's regulatory review of general information pertaining to the application. Volume 3, which addresses post-closure performance, was in draft form. As part of orderly closure, the staff, prior to the end of this fiscal year, will issue publicly available Technical Evaluation Reports, rather than Safety Evaluation Reports, to capture knowledge and document the agency's activities regarding Yucca Mountain. The first Technical Evaluation Report volume will provide the NRC staff's technical assessment of post-closure performance. [This may need updating if TER Volume 3 is issued prior to submission of this response to the Committee]

Prior to the commencement of closure activities, SER Volume 3 had not been published because NRC staff senior management had not completed its review of the document. Drafts of NRC safety evaluations are typically not released publicly because they contain only preliminary, rather than final, staff findings. Public release of this draft document could result in dissemination of potentially incorrect or misleading information to the public and potential litigation over why there were changes made to the draft SER if finalized. This would establish an undesirable precedent for NRC licensing proceedings.

Safety Evaluation Reports are relied upon by the NRC staff in formulating its positions on contested safety issues in adjudicatory proceedings. To ensure fairness to all participants in NRC adjudicatory proceedings, these documents are made available to the Commission at the same time that they become publicly available to the presiding officer and the participants in the adjudication. Accordingly, my fellow Commissioners and I have not had access to the un-redacted draft SER Volume 3. A redacted version has been made available to the Commission and the public as a result of a Freedom of Information Act request. That redacted version does not contain NRC staff findings regarding whether the application satisfies regulatory requirements. The confidentiality of portions of the draft SER preserves the Commission's ability to continue its longstanding tradition of conducting fair and impartial deliberations regarding contested issues in licensing proceedings. Commission review in contested licensing proceedings traditionally does not occur until the Atomic Safety and Licensing Board has issued decisions on the merits of litigated issues.

Subcommittee. The Administration may continue to insist that this program is shut down, but you can be assured that it is not. This report must be released, and this project must move forward.

ADMINISTRATION'S PLAN TO ASSUME RESPONSIBILITY OF SPENT FUEL

Subcommittee. Chairman Jaczko, I would generally ask this to the Department of Energy, but since you're using your position as Chairman of the NRC to fulfill the Administration's plan to shut down Yucca Mountain over the objections of Congress, I figure you can answer this instead. The Associated Press reported last week that the U.S. has 71,862 tons of spent nuclear fuel at reactors in the United States – waste that is stranded there because the Administration killed the Yucca Mountain project. While the waste is safe where it is, estimates are that the pools contain four times the amount of fuel than they were designed to handle. Given that the American public is rightly concerned about this waste spread across the country at 129 sites, especially in the wake of what happened in Japan, what is the Administration's timeline for fulfilling its obligations in assuming responsibility of this waste?

Mr. Jaczko. NRC is confident that spent fuel from any reactor can be stored safely and securely for at least 60 years beyond the licensed life of the reactor.

I would refer you to the Administration for questions regarding their plans.

Subcommittee. Frankly, I find the Administration's lack of a real plan not just absurd, but a waste of taxpayer resources. The American public is worried about keeping this waste in pools, and I can't understand why the Administration would support this vulnerability when it can be stored safely at Yucca Mountain.

YUCCA TERMINATION AND MARCH 22 DC CIRCUIT COURT LAWSUIT

Subcommittee. Dr. Lyons, you are well aware of the position of this subcommittee and the House of Representatives regarding Yucca Mountain. This budget request zeroes out any remaining support for the program.

How would you characterize the current state of the facility?

On March 22 the DC Circuit Court heard opening arguments by representatives of Washington state, South Carolina, and others suing the Department of Energy. They argued—and I would strongly agree—that the Obama administration overstepped its authority in moving to shut down the Yucca Mountain project. I can only hope that the judicial branch will also agree. If the Court rules against the Department, how much funding will you need to stand the Yucca Mountain program back up?

Will you appeal if the decision goes against the Department, as it should?

When does this end?

Dr. Lyons. The Department is confident that it has complied with all legal requirements in its orderly shutdown of the Yucca Mountain project and filing its Motion to Withdraw the License Application. If a Court should rule against the Department, the Department would carefully review the ruling and make a recommendation to the Department of Justice as to how to proceed regarding an appeal. If the Department were required to proceed with licensing, the Department estimates that the likely funding needed would likely be less than the $196.8 million received in the FY 2010 budget. The Yucca site is currently in standby with all facilities shutdown. The Department is committed to pursuing better, more workable alternatives to meet its responsibilities for the safe management and disposal of spent nuclear fuel and high-level waste. To that end, the Department, acting at the direction of the President, has established a Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle. The Commission will provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of spent nuclear fuel and high-level waste. Its interim report is due in July 2011 and its final report in January 2012. When the Commission completes its work and proposes alternative solutions, the Administration will consider proposing new legislation if needed.

YUCCA MOUNTAIN LIABILITY

Subcommittee. Dr. Lyons, the Administration's misguided attempts to kill Yucca Mountain have simply extended the amount of time waste is left on-site and opened the U.S. government to more and more lawsuits. Your fiscal year 2010 Financial Report shows the estimated liability our taxpayers are now faced with to be $15.5 billion, an increase of $2 billion over a year ago, because you have failed to assume responsibility of spent nuclear fuel. Some estimate that this could reach as high as $50 billion.

Your Department is charged with defending this policy. How would it affect your budget if you were to pay all penalties, instead of the Judgment Fund in the Treasury?

Dr. Lyons. The liability estimate of the damages the Government owes the nuclear utilities is predicated on a date the Government begins to accept spent nuclear fuel and high level waste, and at what rate the Government would accept spent nuclear fuel and high level waste. The estimate is based upon guidance provided by the Chief Financial Officer to assume the Government could begin acceptance in 2020 at the previous planned acceptance rate. In conjunction with assumptions of performance, the estimate of damages uses existing settlements with the Government for the determination of the Government's financial exposure to all the utilities for the cost of their storage on site. Currently, damages are paid out the Judgment Fund administered by the Department of Justice. The Department of Energy is not currently required to reimburse the Department of Justice for these expenditures. Should the Department be required to reimburse the Judgment Fund, through statute or some other mechanism, significant consideration within the Administration on how this obligation would be funded would need to be undertaken. Issues such as spending caps, priorities across executive branch agencies, priorities across Departmental programs, and other issues would need to considered.

NUCLEAR WASTE FUND FEES AND LAWSUIT

Subcommittee. Dr. Lyons, you have stated that the Nuclear Waste Fund fee, which charges users of electricity generated by nuclear power $770 million each year, will be needed to implement the Blue Ribbon Commission recommendations. Does this mean that you find the Commission's recommendations binding?

The national body of state utility commissioners, NARUC, has sued the Department again over this fee, protesting that ratepayers have been essentially misled over the last 30 years. You've got more than $25 billion in the Nuclear Waste Fund today, and it's garnering more than $1 billion annually simply in interest on the principal. You don't even have a plan for how this money is going to be used. How do I explain to my constituents that they should be paying more into this every year when they're having a tough time paying their own bills?

Dr. Lyons. Although the Department has determined that a geologic repository at Yucca Mountain is not a workable option and should be terminated, the Department has repeatedly affirmed the Government's commitment to meeting its obligation to dispose of high level waste and spent nuclear fuel. In this regard, I very much look forward to the Blue Ribbon Commission's recommendations, which will inform the Department's decision-making as to how to proceed on these important issues.

As to the Nuclear Waste Fund, the Nuclear Waste Policy Act establishes a fee of one tenth of a cent per kilowatt-hour of electricity generated and sold that must be paid by nuclear utilities and deposited in the Fund. The Act also requires that the Secretary of Energy annually review the adequacy of this fee. If the Secretary determines that either insufficient or excess funds are being collected, the Secretary must transmit a proposed fee adjustment to Congress.

The Department completed its most recent annual review of the adequacy of the Nuclear Waste Fund fee in November 2010. The review concluded that there is no reasonable basis to conclude that the current fee is generating either insufficient or excess funds to cover the costs of the Department's obligation to dispose of the Nation's high-level nuclear waste and spent nuclear fuel. A copy of that determination is available on the U.S.

Department of Energy website at:
http://www.gc.energy.gov/documents/Secretarial_Determination_WasteFee.pdf

The Department is committed to reviewing the fee annually and to making its review publicly available. If the Department concludes in the future that either insufficient or excess revenues are being collected to meet this obligation, the Department will promptly propose an appropriate adjustment of the fee to Congress.

RETENTION OF YUCCA MOUNTAIN WASTE REPOSITORY EXPERTISE

Subcommittee. Expertise on nuclear waste disposal is hard to come by, and the group of experts we have amassed in the last several decades of study of Yucca Mountain is a critical asset for the future of our spent fuel strategy—no matter how we proceed. It seems squarely within the national interest to preserve the expertise and science formerly within the Office of Civilian Radioactive Waste Management on repository research, design, engineering, construction, and licensing, as well as interim waste storage and transportation.

What is the Department doing currently, in fiscal year 2011, to preserve this expertise?

Dr. Lyons. DOE preserved core federal capabilities in the areas of science and program management by retaining key Office of Civilian Radioactive Waste Management (OCRWM) personnel within other Departmental units. Specifically, the expanded Used Nuclear Fuel Disposition program in DOE's Office of Nuclear Energy (NE) is utilizing the expertise that had been developed within OCRWM to conduct the scientific research required to inform future nuclear waste management decisions and to be prepared to evaluate the recommendations from the Blue Ribbon Commission on America's Nuclear Future.

With respect to non-federal employees, the vast majority of contractor personnel who worked on the Yucca Mountain Project did so under contracts with either Sandia National Laboratories or United States of America Repository Services. Those contracts have not been terminated. For example, many of the same laboratory personnel are currently working on research and development projects for NE's Used Fuel Disposition Research and Development program.

Subcommittee. What is the Department proposing to do in the 2012 budget request to this end?

Dr. Lyons. The Department proposes to continue the activities described above that began in FY 2011.

YUCCA MOUNTAIN

NUCLEAR WASTE POLICY ACT

Subcommittee. The Nuclear Waste Policy Act puts into law that Yucca Mountain is the nation's nuclear waste repository. The Administration has clearly expressed a different opinion through its efforts to shut down the Yucca Mountain licensing process and consider other options.

Is the Administration going to propose new legislation to amend the Nuclear Waste Policy Act?

If not, then what does the Administration plan to do?

Dr. Lyons. The Department is committed to pursuing alternatives that are better and more workable than Yucca Mountain and to meeting its responsibilities for the safe management and disposal of spent nuclear fuel and high-level waste. To that end, the Department, acting at the direction of the President, has established a Blue Ribbon Commission on America's Nuclear Future to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle. The Commission will provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of spent nuclear fuel and high-level waste. Its interim report is due in July 2011 and its final report in January 2012. When the Commission completes its work and proposes alternative solutions, the Administration will consider proposing new legislation if needed.

OVERALL DIRECTION FOR R&D PROGRAM

CHANGING DIRECTIONS FOR DOE NUCLEAR ENERGY R&D PROGRAM

Subcommittee. Dr. Lyons, several years ago, GNEP, a short-lived global nuclear partnership funded within your program, was ended. In 2006 the Nuclear Energy office started up the Next Generation Nuclear Plant—or NGNP—program. We've since put about $530 million into the program, plus whatever you've spent so far in 2011—only to see in this year's budget request a 70 percent reduction for NGNP. And now that you're talking about ending or shrinking that program, the budget request adds $96 million to start a new Small Modular Reactors program. We also see $97 million for a new program, "Nuclear Energy Enabling Technologies." For people who have been around a little while, you can't help but think, "Here we go again."

It seems like the direction of your program has changed not only with every administration, but with every Secretary of Energy. So it seems like a good time to ask: Where are we going with this program, and where are you aiming it to go after you've served out your term and the next person takes over? What's your overall roadmap for the Nuclear Energy program?

Dr. Lyons. The Nuclear Energy Research and Development (R&D) Roadmap, dated April 2010, was developed as a long term guide to R&D activities. R&D activities are focused along four main objectives that address challenges to continuing the use of nuclear power: (1) develop technologies and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors; (2) develop improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals; (3) develop sustainable nuclear fuel cycles; and (4) understand and minimize the risks of nuclear proliferation and terrorism. To achieve the nuclear energy R&D goals, the Office of Nuclear Energy budget has been restructured to focus on current and advanced reactor designs, development of sustainable fuel cycles, and crosscutting technologies that support the entire Nuclear Energy R&D portfolio. The Office of Nuclear Energy was concurrently reorganized to support the restructured budget. The Nuclear Energy R&D Roadmap coupled with the realignment of the budget and organization has resulted in a more efficient and effective long-term R&D program to ensure nuclear energy's role in the Nation's energy portfolio.

NEXT GENERATION NUCLEAR PLANT

Subcommittee. Dr. Lyons, the budget request reduces funding for the Next Generation Nuclear Plant program (NGNP) to about $50 million, $113 million below the current level.

From what I understand, funding at the request level would support ongoing research while the Secretary decides whether—and how—to proceed with a cost-shared demonstration project of a full-size plant. When will this decision be made, and what are the possible ways forward?

Dr. Lyons. The timing of the Secretarial decision on the future of the NGNP planned for late in calendar year 2011. The Secretarial decision will consider technical, financial, performance, and other issues in determining the appropriate next steps, including whether to proceed further on the project..

The Energy Policy Act of 2005 (EPAct 2005) (Public Law 109-58) requires NEAC to determine whether the project is ready to move into Phase 2 for final design, licensing, and construction. NEAC is expected to provide a recommendation to the Department in June 2011.

Subcommittee. One of this Subcommittee's ongoing concerns about the demonstration portion of NGNP is that industry has not come to the table with its portion of the shared cost.

What is the total cost of the NGNP demonstration project as originally envisioned? How much of that would be shouldered by the Department of Energy?

Dr. Lyons. The total cost of the NGNP demonstration project is anticipated to be approximately $4.0 billion. The government share will be consistent with Section 988 of the Energy Policy Act of 2005 (EPAct 2005) (Public Law 109-58) and DOE will encourage higher industry contributions.

Subcommittee. Where are the disagreements or causes for concern between industry and the Department?

Dr. Lyons. Both sides are in agreement with the cost-share requirements contained in the Energy Policy Act of 2005 (EPAct 2005)

(Public Law 109-58). However, the Administration believes that cost-sharing should be shared annually throughout the duration of the project. Feedback from potential private sector partners, however, reflects their strong desire to have the government pay the majority share of the upfront costs for design and licensing with industry paying for construction and start-up operation costs, which they claim would result in an overall 50% cost share over the life of the project. The industry's proposed cost-sharing arrangement is unfair to the taxpayer. It shows that this project is not of sufficient priority to industry, does not appropriately share risks and provides no guarantee that the private sector would build the plant once designed and licensed.

Subcommittee. If the Department funded the NGNP demonstration project with the cost-share terms that industry wants, what impact would that have on DOE's Nuclear Energy program?

Dr. Lyons. The costs for NGNP would come at the expense of the other R&D and infrastructure support programs within the Office of Nuclear Energy.

Subcommittee. What will the research and development for NGNP proposed in the budget focus on, and is this research and development funding level enough to wrap up and document the hundreds of millions of dollars spent on NGNP research to date?

Dr. Lyons. In FY 2012 NGNP will continue research and development in materials, fuels, code validation experiments and the integration of reactor operations into industrial applications. The FY 2012 budget also supports the continuation of licensing activities with the NRC necessary to establish a licensing framework for gas-cooled reactors in the United States. These research and development activities involve the design, fabrication, irradiation and post-irradiation-examination of fuels and materials as well as conducting experiments using mock-up facilities to examine accident scenarios and will continue over the next several years. The results of these research and development activities are needed to reduce technology risks as well as to ensure that the appropriate licensing requirements are established to ensure the health and safety of the public and the environment.

NUCLEAR ENERGY ENABLING TECHNOLOGIES NEW BUDGET LINE

Subcommittee. Dr. Lyons, your budget request provides $97 million for a new program, Nuclear Energy Enabling Technologies. Some of that funding is for the existing Modeling and Simulation Hub, and some is for the Idaho user facility, but almost $60 million appears to be for new programs.

Your request says these programs are for “crosscutting” and “transformative” research, but I’d like a better idea of what it is and what we’d get out of it. What should we expect to see come out of these two programs, and is it worth the new money in a budget where you’re proposing to decrease the overall Nuclear Energy program?

Dr. Lyons. The Nuclear Energy Enabling Technologies (NEET) program sponsors research and development in “crosscutting technologies” that directly support our reactor technologies and fuel cycle technologies programs and cutting edge innovations in nuclear energy science and engineering.

The NEET program will conduct crosscutting research and technology development relevant to the various reactor and fuel cycle concepts within the NE research and development (R&D) programs. NEET will coordinate efforts on common technical issues and avoid duplication of efforts in technology development in separate programs. The NEET program is intended to lead and coordinate research that is needed by several NE R&D programs, carry out research that is beyond the scope of individual NE R&D programs, and identify and deliver enabling technologies to achieve critical steps in nuclear technology deployment.

Examples of the types of technologies expected to be developed through NEET crosscutting R&D include the following:

- Improved material performance may include a 5- to 10-fold increase in strength, or increased maximum operating temperature by over 200° Celsius (°C), with a service period of at least 80 years.
- The use of newly developed, high-strength concrete or steel-concrete composite wall construction could significantly reduce construction cost and schedules.

- Advanced instrumentation and sensors could be able to operate in the temperature regimes and harsh environment (e.g., 1000°C gas environment, liquid metals) or directly measure primary process parameters that would otherwise be inferred or measured from a distance with a corresponding loss in precision and increase in uncertainty.

The NEET program will also pursue new and original *high-risk, high-reward* concepts across the full spectrum of nuclear areas, including advanced materials, fuel concepts, and disposal concepts, that have the potential for making significant leaps forward in advanced nuclear technology development. The scope of projects will be related to NE's mission, but not specific to any on-going, mission activities. Projects will be focused on "outside-the-box" breakthroughs and not incremental improvements.

Projects will be selected through open and competitive solicitations designed to encourage broad participation across national laboratories, universities, research institutions, and industry, with an emphasis on tapping into a non-traditional recipient pool. Awards will likely span 2-3 years, depending upon project scope. Applications will be peer-reviewed by a body of internal and external experts to help select promising concepts, and to ensure that activities are not duplicative of any existing R&D activities. NE will monitor progress and ultimately consider the outcomes of funded activities within the context of its mission-specific activities.

INCREASE FOR PROGRAM DIRECTION

Subcommittee. Dr. Lyons, in the 2012 request, your budget goes down by $30 million from the current level. At the same, you propose to increase Program Direction by $20 million.

Why do you need more for people and oversight, when your program would be slightly smaller than last year?

Dr. Lyons. The Office of Nuclear Energy is responsible for funding legacy activities associated with the closure of the Department's Office of Civilian Radioactive Waste Management (OCRWM) and termination of the Yucca Mountain Project. The FY 2012 request for Program Direction includes additional funding to support 33 FTEs from the Office of the General Counsel responsible for providing management and oversight for Nuclear Waste Policy Act activities, on-going litigation and administration of the Nuclear Waste Fund and Standard Contracts with Utilities. In addition, the budget request includes additional funding for 1 FTE from the Energy Information Administration responsible for supporting administration of the Nuclear Waste Fund.

In addition to federal staff in other Departmental offices, the FY 2012 Program Direction request supports an additional 23 FTEs within the Office of Nuclear Energy, hired from OCRWM, that provide management oversight on R&D activities associated with spent fuel and high level waste management. The request provides funds required for the salaries and benefits, travel, support services, and other related expenses for NE, GC, and EIA personnel included in the request. The increase also reflects escalation in costs from the FY 2010 Program Direction funding level, adjusted to reflect the current pay freeze for federal personnel.

NUCLEAR ENERGY

COMPETITIVENESS AND THE NUCLEAR ENERGY GLOBAL LANDSCAPE

Subcommittee. It may be too early to tell how the events in Japan this month will affect the global landscape of nuclear plant construction, but at least some countries have reacted. Germany has ordered a temporary shutdown of some plants, while Switzerland and China have suspended approvals of new plants while they conduct safety checks.

Do you believe the events in Japan are or will impact new nuclear plant construction in these and other countries?

Dr. Lyons. The consequences of the events in Japan have led most governments to call for comprehensive safety reviews of operating reactors, new reactor designs and existing regulations. A limited number of countries have suspended licensing or other activities associated with new reactor builds pending a review of the events that are still ongoing at the Fukushima site. A small number of countries have indicated their intent to cancel pre-existing plans to explore nuclear energy options, including planned new builds. Other countries are waiting for a resolution of the situation at Fukushima before making permanent decisions.

However, most countries currently operating nuclear power plants, or who have initiated the process to construct new reactors, have indicated their intent to proceed with their plans for nuclear power after absorbing and applying "lessons learned" from the Fukushima event.

Subcommittee. There is no doubt that we need to learn from the experience at the Fukushima plant in Japan to ensure our plants—both operating and new—are safe. But assuming that new construction overseas continues, I have some serious concerns about the global competition.

The Administration has emphasized the importance of clean energy's role in American competitiveness. In the nuclear energy industry, other nations have been moving forward in haste, building new reactors using other countries' designs with parts manufactured in other countries and constructed with other countries workers. We have created the nuclear industry, but now we find our leadership in it at risk.

With such great concern about American competitiveness, why has the Department omitted nuclear energy research and development from its proposed increases in the budget request?

Dr. Lyons. The Administration continues to strongly support nuclear energy as a key component for achieving its national energy and climates. Over 100 nuclear power plants are currently offering reliable and affordable baseload electricity in the United States, supplying approximately 20 percent of the Nation's electricity and over 70 percent of clean, non-carbon producing electricity. Supporting continued Safety and security of nuclear energy is a key priority and well-supported by the Office of Nuclear Energy's FY 2012 budget request.

The FY 2012 budget request includes funding for accelerating the commercialization of Light Water Reactor Small Modular Reactors through a cost-shared arrangement with industry. In addition, the budget includes support for R&D activities focused on establishing the scientific and safety bases for extending the life of existing nuclear plants. Funds are also requested for R&D on a number of advanced reactor and fuel cycle technologies that may provide new and robust options supporting the expansion of nuclear power domestically and internationally. Funding also supports research and development to enable storage, transportation, and disposal of used nuclear fuel and all radioactive wastes. All activities will take into account lessons learned from the events at the Fukushima plant in Japan where applicable. The cumulative impact of the activities supported in the FY 2012 budget request will help affirm the United State's continued leadership in nuclear energy and help bolster the competitiveness of the domestic nuclear industry.

DEPARTMENT OF ENERGY ASSISTANCE TO JAPAN

Subcommittee. Dr. Lyons, I know you have been extremely busy since the earthquake and tsunamis in Japan three weeks ago, and we all appreciate your hard work in assisting with the difficult situation at the Fukushima reactors. Two weeks ago, Secretary Chu explained to the Subcommittee the assistance that the Department gave in the first week following the earthquake.

Can you give us an update on how the Department has been assisting Japan with the situation at the Fukushima site in the last two weeks?

What additional assistance is the United States going to offer in the coming days, weeks, and possibly beyond?

Dr. Lyons. The primary role of the Department of Energy in response to the situation at the Fukushima reactors is to monitor the radiation releases and predict their impact on the population of the United States and on U.S. citizens in Japan. This is being done by the National Nuclear Security Administration (NNSA) through their Aerial Measuring System as well as ground detectors deployed along with its Consequence Management Response Teams.

In addition, the Office of Nuclear Energy has established a response team that is working closely with the Nuclear Regulatory Commission and the U.S. nuclear industry to monitor the situation at Fukushima. This includes using technical resources at the national laboratories to analyze data from the incident and to anticipate future problems. The results from this work are being communicated to Japan to assist their own analysis efforts.

The DOE response team is also using the radioactive waste management expertise developed by the Office of Environmental Management to provide technical advice to the Japanese. This expertise covers the collection, storage, and eventual treatment of the highly radioactive waste that has been generated from the incident.

The United States anticipates receiving requests for assistance from the Japanese for the foreseeable future. These requests will be handled on a case-by-case basis and will include a discussion about the proper compensation for the assistance provided.

RESEARCH RESPONSE TO JAPAN EARTHQUAKE REACTOR INCIDENTS

Subcommittee. In light of the events in Japan, are there any immediate changes you are making or considering to the research program at the Department?

Are you considering proposals for changes to the nuclear energy research programs as a result of events at the Fukushima reactors this month?

Dr. Lyons. From our preliminary assessments of the events in Japan and our engagement with our industry partners, Japanese organizations, and other involved agencies, we are identifying areas where new R&D efforts could yield additional insights on the multi-faceted problems experienced by the Fukushima Dai-ichi units and, concurrently, evaluating the applicability of those insights to the existing and future commercial nuclear reactors. Appropriate responses to these issues would be incorporated into Office of Nuclear Energy R&D programs.

Many of the Office of Nuclear Energy research programs are already highly relevant to the future of nuclear power in the United States in light of the events at the Fukushima reactors. For example, our research into high temperature gas reactor designs, as well as our proposed Small Modular Reactor program, provide for inherent safety features. The Office of Nuclear Energy also performs research on fuel cycles. We are conducting R&D into a broad range of options for the Nation's fuel cycle with careful attention to safety, environmental protection, and nonproliferation. In addition, our cross-cutting research into areas like advanced materials and instrumentation is exploring technologies that could enable future safety enhancements, such as fuel claddings that cannot generate hydrogen in an accident or fuels that are virtually impossible to melt. The new Modeling and Simulation Hub, based at the Oak Ridge National Laboratory, will provide new capabilities to the nuclear industry that can be used to assess and improve the safety of existing reactors.

Subcommittee. The budget request's proposal of $96 million for a new Small Modular Reactor—or "SMR"— program mirrors widespread interest in the technology. We hear many different accounts, however, of the expected advantages of small modular reactors.

What safety advantages do these small reactors have over the full-scale "Gen 3+" reactors being considered for construction today? I've heard it said that SMRs would be impervious to meltdowns. Is this true, or does this depend on the specific design?

Dr. Lyons. Most of the light water-based SMR designs are similar to some of the Gen 3+ designs in that they employ natural convection for cooling under accident conditions. This means that the circulation of water over the fuel is driven by thermal gradients and gravity, so there is no need for powered pumps. This passive cooling capability does not require emergency generators or additional operator actions to continue cooling a reactor core. SMRs are expected to have the following advantages over Gen 3+ reactors with respect to accident resistance:

- The smaller cores have smaller fission product inventories and lower decay heat, requiring less water to cool.
- The designs integrate primary system components within the reactor pressure vessels eliminating large-break loss-of-coolant accidents.
- Certain SMR designs employ high-strength stainless steel containment that are stronger than typical RPVs.

Subcommittee. What about economic advantages over the Gen 3+ reactors?

Dr. Lyons. There may be situations where a utility could use an SMR but not a large Gen 3+ plant to meet electricity demands, such as to replace a 100-300 MW coal plant or to meet moderate customer growth in remote areas of the grid. On a unit basis, the light water-based SMR designs that will be considered through the LWR SMR Licensing Technical Support program are expected to cost on the order of $200 -$800 million per module (45-200 MW), as compared to $8-12 B per large (1000 MW) Gen 3+ reactors. If offsite fabrication is doable, it is expected that SMR construction costs will decrease as factory processes are optimized and assembly times are shortened. However, competitiveness of the plants on a cost per kilowatt of electricity delivered is still uncertain.

Subcommittee. What about licensing? Do you think it will be easier or more difficult to site and license these smaller reactors?

Dr. Lyons. The light water-based SMRs represent a fairly mature technology and are expected to be licensed under the same regulatory framework as the large Gen 3+ reactors. It is anticipated that SMRs will be easier to site because they will have lower cooling water requirements than the large plants. In fact some of the designs have an air cooling option which could further expand their set of potential sites. Based on some of the unique safety and operating characteristics of SMRs, the industry has been working with the Nuclear Regulatory Commission (NRC) to re-examine some of the regulatory requirements for licensing fees, staffing, security, emergency preparedness zones, and decommissioning to determine if adjustments are warranted. This process has already begun, and could result in changes from some current requirements for large LWRs, with potential associated cost savings. While the first-of-a-kind reviews for these SMRs will not be any less comprehensive and are not expected to be any easier or faster than the reviews of Gen 3+ reactors, subsequent reviews of any standardized designs are expected to move quicker.

Subcommittee. In what other areas might small modular reactors have other advantages or disadvantages?

Dr. Lyons. In addition to the potential safety and economic benefits identified above, SMRs have a number of other potential advantages such as:

- May provide a suitably sized source of process heat for industrial applications such as desalinization, shale oil recovery, and fuel manufacture, in addition to power production missions;

- May have increased product quality through controlled factory fabrication of modules and major components;

- May provide additional proliferation resistance because the advanced designs may be able to operate with longer fuel cycles and could provide options for sealed reactor vessels that would be returned to the originator for refueling.

SMALL MODULAR REACTOR COST-SHARE LICENSING PROJECT

Subcommittee. Dr. Lyons, the budget request slows down one cost-share demonstration project, the Next Generation Nuclear Plant, while it awaits a Secretarial decision and direction on the recommended path forward. At the same time, the budget request proposes to start another cost-share effort for Small Modular Reactors.

Can you clarify for the subcommittee what differentiates these two programs that justifies slowing down one and starting another?

Dr. Lyons. One key difference between these programs is that light water based Small Modular Reactors (SMRs) can be commercialized much sooner than gas cooled reactors given that SMRs utilize proven light water reactor technology and have support from a number of companies currently investing in the development of SMR designs. Furthermore, the SMR market is aimed at electrical utilities familiar with commercial nuclear power plants which supports the rapid commercialization with the earliest plants projected for completion in 2020.

Subcommittee. What is different about the Small Modular Reactors program that will ensure it succeeds where the Next Generation Nuclear Plant has not been as successful?

Dr. Lyons. The SMR cost share program will focus on commercial deployment of designs that utilize relatively mature light water-based SMR technologies that can be licensed within the existing Nuclear Regulatory Commission (NRC) regulatory framework in a relatively near-term timeframe. As such, it is intended that the program will help accelerate the commercialization of light water reactor-based SMRs rather than attempt to demonstrate the viability of a large-scale advanced technology, as is the case with the Next Generation Nuclear Plant Demonstration Project. The private sector is currently funding the development of SMRs, and there has been a great deal of interest on the part of utilities and generation and transmission cooperatives for deployment of SMRs to meet their energy growth requirements and to replace aging generation capacity, primarily coal plants. NGNP is focused on electricity production and the ability to provide high-temperature heat. The operation and integration of gas-cooled reactors into industrial processes for process heat will require a much longer learning curve to fully integrate a new reactor technology into industrial operations such as oil refining or chemical processing.

Subcommittee. What do you see as the biggest risk to the small modular reactor program?

Dr. Lyons. It is likely that the largest risks in the SMR cost share program will be the ability of vendors to achieve their cost targets whether the market and other factors align sufficiently for industry to decide to deploy the technology. While the technologies employed in these light water reactor-based SMRs are mature and well-characterized, there are differences inherent to these integral designs. The competitiveness of the plants on a cost per kilowatt of electricity delivered is still uncertain and the technological differences may result in additional review and analysis on the part of the regulator.

Subcommittee. The Small Modular Reactor program moves forward with licensing and engineering on these novel reactors, while also putting funds into research for new small reactor concepts. Is the technology ready and the timing right for small modular reactors?

Dr. Lyons. It is ultimately industry's decision whether to obtain licenses and deploy SMRs but the Department believes that the light water-based SMR technologies are at a point where certification and licensing are achievable in the timeframes identified in the FY 2012 budget request. The LWR SMR Licensing Technical Assistance will provide engineering assistance in support of design certification for two LWR-based SMR designs to help accelerate commercialization and encourage competition in the marketplace. DOE will also support research and development on advanced SMR technologies and capabilities to improve the outlook for those designs, such as liquid metal and molten salt-based technologies. However, the timeframe for licensing and commercialization of these types of plants is expected to be many years beyond the time frame for light water SMRs.

Subcommittee. Will the NRC have both the capacity and the willingness to engage with the Department and with industry in the licensing process for these new small reactors?

Dr. Lyons. This question is more appropriately addressed to the Nuclear Regulatory Commission.

SMALL MODULAR REACTOR RESEARCH AND DEVELOPMENT

Subcommittee. Dr. Lyons, the budget request includes $29 million for the research and development of small modular reactors.

What types of reactors does this research aim to develop, and what advantages could they have over the light water reactors that the licensing cost-share program would support?

Dr. Lyons. The funds will be primarily focused on research, development and demonstration activities for advanced SMRs such as gas, liquid metal and molten salt-cooled designs, and evaluation of innovative SMR concepts that support unique missions and capabilities, such as load following or remote use applications. The funding will support enhancements in instrumentation and control systems required for multiple modules and unique environments; development of materials, fuels and fabrication techniques that are important to addressing the distinct operating conditions that will be experienced in gas, metal and salt-cooled SMRs; tools needed to assess the safety, performance and economics of these advanced designs; and, capabilities required to assure the safety of the designs, such as improvements in ability to probabilistically predict plant performance under accident conditions. These advanced designs have the potential advantages of more efficient operation and greater proliferation resistance.

ADVANCED REACTOR CONCEPTS RESEARCH AND DEVELOPMENT

Subcommittee. In addition to the Next Generation Nuclear Plant and Small Modular Reactor research work, what advanced reactor concepts does the budget request propose to develop? What are the theoretical advantages of these concepts over current designs?

Dr. Lyons. The budget continues to support the development of advanced technologies through the Gen IV international forum. One particular advanced concept supported in the FY 2012 budget is the fluoride salt-cooled high-temperature reactor (FHR) for high temperature missions.

The FHR has emerged as a potential high temperature option for industrial process heat applications. The utilization of molten salt coolant allows a compact low pressure reactor with a high outlet temperature. Significant R&D is needed before this technology would be ready for use but potential advantages may be improved economics and inherent safety.

Subcommittee. Across the Department of Energy, we constantly debate and evaluate whether programs should focus on near-term or long-term technology development. How far out is the advanced research looking? In other words, is most of the research geared towards designs that would be ready for the market in 5 years? 10 years? 30 years?

Is that a shift from previous years?

Dr. Lyons. The budget supports a mix of near- and long-term R&D to ensure new ideas are being developed for future potential needs. Activities are focused where the federal role is strongest.

MODELING AND SIMULATION ENERGY INNOVATION HUB

Subcommittee. The Modeling and Simulation Energy Innovation Hub was funded for the first time in fiscal year 2010, and I understand the Hub is still starting up.

Dr. Lyons, can you give the Subcommittee an update on the current status of the Hub? Is it fully staffed, has the staff moved into their permanent offices, and has research work begun?

Dr. Lyons. The selection of the team to run the NE Modeling and Simulation Energy Innovation Hub was announced on May 28, 2011. The team, known as the Consortium for the Advanced Simulation of Light-water-reactors (CASL), is being led by Oak Ridge National Laboratory. The Hub is fully staffed and is currently in the process of moving into its permanent offices, which will be officially opened and dedicated the first week of May.

Subcommittee. How would you rate the success of this Hub so far? How long do we have to wait until we see the first concrete results, and what form will they take?

Dr. Lyons. To date the Modeling and Simulation Hub has shown notable success. The team of industry, university, and national laboratory researchers has made great progress to define and develop the code capabilities that will result in a virtual model of an operating TVA pressurized water reactor. The first major result of this work was completed on March 31, 2011 with the delivery of version 1.0 of the virtual reactor capability. This capability will be demonstrated at the Hub collaboration center during the dedication ceremony the first week of May.

Subcommittee. We have seen reports and speculation that the Hub may change some of its core goals in response to the Fukushima reactor events in Japan. Is this something the Department is considering? If you make this change, what other research will you be displacing?

Dr. Lyons. In fiscal year (FY) 2011 the Department did not fund the Integrated University Program and the FY 2012 does not support the program. The program is a less efficient means to advance the Administration's STEM objectives than other existing programs. And the nuclear industry, as it expands, will create incentives for students to enter nuclear-related programs.

Through its Nuclear Energy University Programs, the Office of Nuclear Energy will continue to support universities and their students in FY 2012 by awarding competitive grants and contracts funded by up to 20 percent of its overall R&D programs' budget.

ELIMINATION OF THE INTEGRATED UNIVERSITY PROGRAM

Subcommittee. Dr. Lyons and Chairman Jaczko, the budget requests for both of your agencies eliminate funding for the University Program, which this Subcommittee has funded in the past to support a pipeline of nuclear engineers and scientists coming out of American universities.

With the American nuclear engineer workforce nearing a time of high retirements and the pipeline of graduating students still not growing sufficiently to fill the spots, why have you eliminated the University Program—especially given our need to keep our reactors safe both now and in the future?

Dr. Lyons and Mr. Jaczko. In fiscal year (FY) 2011 the Department did not fund the Integrated University Program and the FY 2012 does not support the program. The program is a less efficient means to advance the Administration's STEM objectives than other existing programs. And the nuclear industry, as it expands, will create incentives for students to enter nuclear-related programs.

Through its Nuclear Energy University Programs, the Office of Nuclear Energy will continue to support universities and their students in FY 2012 by awarding competitive grants and contracts funded by up to 20 percent of its overall R&D programs' budget.

Subcommittee. We have heard that only a small portion of nuclear engineers currently go to work for industry. Given that, why do you believe that industry will fill in financial support in place of these university programs, as stated in the Department of Energy's budget request?

Dr. Lyons and Mr. Jaczko. It is difficult to isolate hard data on utility staffing, however, companies that generate and sell nuclear power and employ reactor engineers will do whatever is needed to assure they have the necessary technical expertise to sustain their operations. They are keenly aware that their workforces are aging. .

To assure the United States maintains sufficient numbers of nuclear experts, the DOE's Office of Nuclear Energy is investing up to 20% of its R&D budget in US Universities, creating the research opportunities that will attract highly qualified people to nuclear engineering and related professions.

NEW PROGRAM STUDYING EXTRACTION OF SEA WATER URANIUM

Subcommittee. The budget request proposes a new Fuel Resources program, which would begin by researching technology to cost-effectively extract uranium from seawater.

How mature is this technology, and how far do you believe it is from being cost-effective?

Dr. Lyons. Despite recent advancements reported by Japanese researchers, the technology of extracting uranium from seawater is considered to be in its early development stage. Based on published Japanese data, the cost of seawater uranium extraction under an optimistic scenario, in which several significant technical challenges are favorably overcome, is over twice that of the current uranium spot price.

Subcommittee. The budget request proposes $4.6 million for the program. Do you foresee wanting to expand this program in the future, or is this funding level sufficient to fully develop the technology?

Dr. Lyons. The budget request in FY 2012 will support an integrated approach that targets key technology components to enhance the absorption efficiency and selectivity. The program will work to develop advanced adsorbent materials with a goal to double the uranium adsorption capacity over the current best technology within three years. All future funding will be determined through future budget development processes, considering competing priorities and other factors. If the near-term goal is met, the Department will evaluate whether to progress into the next phase of development and it is anticipated that if R&D is successful then industrial partners would emerge to cost-share final development of the technology.

Subcommittee. Do you believe that seawater uranium extraction could be cheap enough to compete at today's uranium prices? Can you give me an idea of how cheap it could be compared to today's uranium prices?

Dr. Lyons. Based on published Japanese data, the cost of seawater uranium extraction under an optimistic scenario, in which several significant technical challenges are favorably overcome, is over twice that of the current uranium spot price. While it is difficult to speculate on the ultimate price of seawater uranium extraction technology, the Japanese data indicates that about 70% of the recovery cost is due to the cost of the adsorbent materials. The Fuel Resources program aims to develop cheaper and more efficient adsorbent materials by taking advantage of recent advancements in nanotechnology. The successful development of nanoscale adsorbents could contribute significantly to reductions in the cost of extracting uranium. The final cost of extraction and other costs associated with commercializing the technology would also depend on many other factors difficult to predict at this early stage. Uranium from seawater offers a potentially limitless supply of the material, if obtaining it is commercially cost competitive.

Subcommittee. How large is the seawater uranium resource compared to the available mined uranium resources?

Dr. Lyons. Conventional mined uranium resources are defined in the Red Book (published in 2009 by the Nuclear Energy Agency, Organization for Economic Cooperation and Development) as resources minable as a primary product, a co-product, or an important by-product. Reported conventional resources are estimated at less than 20 million tonnes of uranium. In comparison, the world's oceans are estimated to contain over 4,000 million tonnes of uranium, two hundred times greater than that of the conventional resources. However, uranium in seawater is very dilute with concentrations on the order of 3 parts per billion and therein lays one of the challenges in its use as a fuel resource.

COOPERATION WITH NUCLEAR REGULATORY COMMISSION

Subcommittee. What are the obstacles to effective cooperation on licensing and safety oversight between the Department and the Nuclear Regulatory Commission?

What is being done to remove those obstacles?

Dr. Lyons. No major obstacles to effective cooperation exist between the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). The DOE and NRC coordinate closely on a variety of issues related to reactor licensing and safety oversight while assuring that our distinct missions and responsibilities are never compromised.

We are collaborating on licensing of large light water reactors, high-temperature gas-cooled reactors under the Next Generation Nuclear Plant (NGNP) Demonstration Project, and on Small Modular Reactors. As a specific example, the Department is currently engaged with the NRC and the Nuclear Energy Institute on licensing initiatives that will support the deployment of Small Modular Reactors (SMRs) by recognizing unique design features of those reactors and their smaller size. The Department and the NRC engage in ongoing discussions, participate together in various forums and draw upon close professional relationships of senior leaders at each agency. The Department is working with the NRC on high-temperature gas-cooled reactors using the existing NGNP Memorandum of Understanding and plans to establish additional MOUs to further enhance cooperation.

DEEP BURN FUEL RESEARCH

Subcommittee. Dr. Lyons, I understand that the Deep Burn fuel program has been exploring some productive avenues aiming to extract much more energy from a given quantity of nuclear fuel and otherwise improve fuel and its usage.

Can you update us on the status of the Deep Burn program and the different fuel options you are exploring or considering?

Dr. Lyons. The original concept of Deep Burn refers to the objective of providing enhanced energy production from a Very High Temperature Gas Reactor (VHTR) fuel by the recycling of transuranic material from used VHTR reactor fuel back into new fuel for placement into a VHTR. Included in the scope of the original VHTR Deep Burn program was analysis to support the use of High Temperature Gas Reactors (HTGRs) in light water reactor (LWR) spent fuel management by using HTGRs to recycle LWR used fuel to reduce used fuel transuranic (TRU) inventories - particularly plutonium and americium. The original program was funded primarily by Congressionally directed funding, ended in FY 2010.

In 2011, responsibility for the Deep Burn activities shifted to the NE Fuel Cycle Research and Development (FCR&D) program. With this transfer, the focus of the effort switched to seeking improved fuel utilization and safety of LWRs. This new LWR oriented effort is complementary and supportive of the NE Light Water Reactor Sustainability (LWRS) program, and is exploring more advanced fuel options than previously considered in the current LWRS program. Moreover, the fundamental improvements being made in the particle-based fuels can also enable or contribute to other advanced reactor concepts of interest to the department.

Subcommittee. Can you tell us how much funding Deep Burn received so far in the fiscal year? What will the future funding needs of this effort be?

Dr. Lyons. FY 2011 Fuel Cycle R&D funding planned under the current Continuing Resolution for Deep Burn related activities is $3.7 million. However, combined with prior-year carryover, and because of the improved focus for this area, we anticipate having about $9.5 million available for supporting deep burn related activities. The FY 2012 Budget

Request anticipates funding of approximately $5 million. Enhanced accident tolerant LWR fuels that would minimize the production of hydrogen and melted fuel under extreme accidents is a strong consideration for future work in light of the Fukushima accident. Much of the work will be carried out in collaboration in national laboratory and U.S. industrial partnerships. Funding for FY 2013 and beyond will depend on decisions made in the near future and will reflect overall nuclear R&D needs and priorities as well as LWR extended burn accomplishments.

Subcommittee. Can you explain the advantages of some of the concepts over today's fuel and reactor cycle?

Dr. Lyons. The prime focus is on a silicon carbide, particle fuel bearing matrix that can be inserted into an existing LWR clad system. This is being pursued due to its potential for significantly enhancing the safety and economic performance of the LWR fuel. The key to its safety is the fact that the fission products are retained within the fuel itself (a primary containment) and have a secondary barrier to release in the fuel compact. In comparison with current uranium oxide fuels this is an additional two barriers preventing release. By replacing the normal zircaloy metal fuel cladding with a silicon carbide or other non-hydrogen-producing clad, the safety aspect of this new fuel could be significantly enhanced due to its potential of yielding a fuel which can tolerate higher temperatures without melting or produce significant quantities of hydrogen in severe accidents.

Subcommittee. What changes would have to happen, both systemically and legally, to support these options if they were to be used, for example, in our current light water reactors?

Dr. Lyons. Such fuels may require enrichments up to 20 %, beyond the 5% enrichment that is the current industry standard set through NRC licensing.

PLUTONIUM-238 PRODUCTION RESTART PROJECT

Subcommittee. Dr. Lyons, the budget request includes $10 million to restart production of plutonium-238, an isotope used for in-space power applications and some other uses. The budget request shares the project cost equally between the Department of Energy and NASA, while I believe NASA will use the vast majority of the material produced.

What is the rationale for splitting the cost equally, when NASA is the primary user of plutonium-238?

Dr. Lyons. The proposed DOE-NASA funding allocation acknowledges the Department's responsibility to maintain a national capability for a range of Federal users if needed and its responsibility to manage efforts related to the safe and secure production of special nuclear material. Considering DOE's role in this project the proposed cost sharing arrangement between DOE and NASA is appropriate.

PROPOSAL FOR INTERNATIONAL NUCLEAR ENERGY COOPERATION

Subcommittee. Dr. Lyons, the budget request proposes $3 million for a new International Nuclear Energy Cooperation program, to aggregate international cooperation across the Nuclear Energy program into one office.

Does the requested new program indicate a new program, or an aggregation of existing activities into one, more visible line item?

Does the request indicate the intent to increase funding devoted to international collaborations?

Dr. Lyons. The FY 2012 Budget Request reflects the need for a dedicated program and funding line item to most effectively integrate and manage the aggregate of significant and ongoing international and technically-based nuclear energy cooperation activities. This is not a proposal for a new set of technical program activities. The budget request for the International Nuclear Energy Cooperation does reflect a relatively modest increase in funding devoted to international collaborations. This growth in international technical activities is a reflection and acknowledgement of the increasingly integrated nature of the global nuclear industry and technical community.

Subcommittee. Following the events in Japan, do you believe the type of work done in international collaborations may be different in the coming year?

Dr. Lyons. At present, we do not expect that our international collaborations will be different in the coming year, and we will continue to place the highest priority on nuclear safety, security and nonproliferation. Regarding Japan, we will continue to monitor closely the situation in Japan and respond to requests for assistance to Japan in whatever way possible.

USED NUCLEAR FUEL DISPOSITION RESEARCH PROGRAM

Subcommittee. Dr. Lyons, the budget request proposes $37 million for the Used Nuclear Fuel Disposition research and development program, a $29 million increase. This program appears to be the replacement or last vestiges of the Yucca Mountain repository program.

How will this program's work relate to the Blue Ribbon Commission? Does this proposal "put the cart before the horse" if you don't yet know what the Commission will recommend?

Dr. Lyons. The Blue Ribbon Commission (BRC) is conducting a comprehensive review of policies for managing the back end of the nuclear fuel cycle and will provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of civilian and defense spent nuclear fuel and high-level radioactive waste. Regardless of the alternatives BRC recommends, DOE will still be challenged with storage, transportation, and disposal of nuclear waste, and therefore the proposed work for FY 2012 is necessary. For example, DOE needs to research issues such as the development of technical bases for longer storage and subsequent transportation of nuclear waste. Extended storage may be an explicit recommendation of the BRC, but even if it is not, the lengthy characterization and development times at Yucca Mountain, WIPP, and repositories in other countries show that the spent fuel is likely to be in extended storage in any event. With respect to disposal, over the past twenty five years, DOE has focused on studying Yucca Mountain and the models and knowledge related to disposal are somewhat Yucca Mountain specific. We are now developing more generic tools and technical bases for disposal, independent of the forthcoming BRC recommendations, because disposal will be required regardless. The R&D will help make the Department more prepared in terms of appropriate models and datasets to implement any forthcoming BRC recommendations on disposal that the Administration decides to pursue.

Subcommittee. Will the Used Nuclear Fuel Disposition program study permanent waste repositories as part of its research?

Dr. Lyons. The Used Nuclear Fuel Disposition program is already studying and will continue to study permanent waste repositories as part of its research. The National Academy of Science has published numerous reports endorsing the use of permanent repositories for nuclear waste and there is worldwide consensus that some disposal will ultimately be required.

ADDITIONAL MEMBER QUESTIONS

ADDITIONAL QUESTIONS FROM MR. SIMPSON OF IDAHO

Mr. Simpson. Dr. Jazcko, in your testimony you have repeatedly characterized the voting process in adjudicatory matters as a less than formal process. This seems inconsistent with statements provided by other Commissioners and the procedures identified in Chapter III or the Commission's Internal Procedures. Appendix 3 of those procedures provides an example voting sheet to be used in matters pending before the Commission.

Was this voting process used in establishing the Commission's position on this matter and were these votes sheets submitted to the Secretary of the Commission for tally and reporting? Or was some other less formal process used? Please clarify the process used in voting and provide any changes to Commission procedures that may not be publicly available.

Mr. Jaczko. The notation vote process in Appendix 3 of the Internal Commission procedures applies to adjudicatory matters, and was used here. As an initial matter, the Office of Commission Appellate Adjudication (an office charged principally with drafting appellate opinions for the Commission) transmits to the Commission a notation vote paper, which typically contains one or more proposed adjudicatory decisions, together with a recommendation for Commission action. Individual Commissioners then cast votes on the matter consistent with Chapter III of the Internal Commission Procedures. Votes in the high-level waste case have been transmitted to the Secretary of the Commission, as they are in all voting matters. These votes represent the initial views of individual Commissioners. In adjudicatory matters (again, as in all voting matters), votes may subsequently be supplemented, withdrawn and re-filed, edited or otherwise revised during the deliberative process. Once initial voting is completed, OCAA will compile a draft memorandum and order reflecting the Commissioners' views. Additional deliberations may occur in an effort to reach a majority or consensus Commission decision. Once a Commission majority reaches agreement on a Commission decision, the Commissioners affirm their positions on the final decision in a public affirmation session, and the final order is issued by the Secretary of the Commission. The final decision serves as the Commission record on the adjudicatory question or questions at hand. Like a judicial decision, a Commission decision may include the dissenting or concurring opinions of individual Commissioners.

Mr. Simpson. While this Committee has no intention of presuming the outcome of the Commission's decision, we do not understand why you have not made a timely closure to this matter. In your testimony, you state that in adjudicatory matters, processes used to achieve decisions are different from routine matters.

Would you explain that process?

Mr. Jaczko. When an adjudicatory issue comes before the Commission, the Office of Commission Appellate Adjudication (OCAA) typically drafts one or more proposed decisions for Commission consideration. The OCAA proposal is transmitted to the Commission for notation vote, consistent with Chapter III of the Internal Commission Procedures. Each Commissioner initially votes on the OCAA proposal; in addition to approving or disapproving staff recommendations, these votes may include revisions to the draft decision(s) proposed, or direct other staff action. Votes may subsequently be supplemented, edited, or withdrawn and re-filed as part of the Commission's deliberative process. Once voting is completed, OCAA will compile a draft decision reflecting the Commissioners' votes. As discussed above, additional deliberations may occur until there is majority agreement on what the Order should say. Once a Commission majority reaches agreement, a final decision will be affirmed and issued.

Subcommittee. Also, please clarify if the process described in Appendix 5 of the Commission's Internal Procedures is used in resolving 2-2 votes in adjudicatory matters and if not, what process is followed?

Mr. Jaczko. Yes. As stated in Appendix 5, as a general matter, requests for Commission action may be denied if the Commission vote is 2-2. In the adjudicatory context, for example, a 2-2 vote may result in denial of motions in adjudicatory proceedings; denial of motions for reconsideration challenging Commission adjudicatory orders, and denial of review of Licensing Board decisions. If the Commission is deadlocked on an adjudicatory matter, the Commission may issue an order stating that a majority position could not be reached, together with any separate statements of individual Commissioners (if applicable). That order will not be issued until a Commission majority agrees to the text of that order.

Mr. Simpson. Also, please have the Secretary for the Commission review the historical records and provide the following for each matter before the Commission where a quorum of Commissioners have affirmed their votes but a majority decision was not reached:

a. A brief description of the matter.
b. The date when the matter was first brought to the Commission.
c. The date when a quorum of Commissioners filed their votes with the Secretary of the Commission.
d. The date when all participating Commissioners filed their votes with the Secretary.
e. The length of time between the last filing of votes and the issuance of a draft Staff Requirements Memorandum (SRM) or order.
f. The length of time between the draft SRM or order and the completion of voting on the final SRM and order.
g. The length of time between the completion of voting on the final SRM or order and the affirmation of their vote by the Commission.
h. A copy of each final SRM or order and affirmation statements, if any, by individual Commissioners.

Mr. Jaczko. The following Orders were affirmed by the Commission where a majority decision was not reached.

CLI-78-8 – Edlow International Co. (Agent for the Government of India on Application to Export Special Nuclear Materials

CLI-80-39 – Metropolitan Edison Co. (Three Mile Island Nuclear Station, Unit 1)

CLI-80-35 – Public Service Co. of Oklahoma (Black Fox Station, Units 1 and 2)

CLI-81-16 – Statement of Policy: Further Commission Guidance for Power Reactor Operating Licenses

CLI-82-8 – United States Department of Energy, Project Management Corporation, Tennessee Valley Authority (Clinch River Breeder Reactor Plant)

A copy of the publically available Orders is attached.

Mr. Simpson. Dr. Jaczko, in your testimony you stated that the Commission policy to begin to close down the review of the application was established in the Commission's FY-11 Budget.

Yet is it not true that policy was established when the NRC only had 3 Commissioners, two of whom have publicly stated that you are not correctly the implementing the Commissions' decision?

Furthermore, this matter was not taken up by the current Commission and therefore is it not true you have you have acted unilaterally and did not seek the Commission's approval?

How is that consistent with Commission procedures and statements you have made before this committee?

Mr. Jaczko. The instruction to carry out the agency's High-Level Waste program while operating under the continuing resolution in accordance with the guidance in the Commission's FY 2011 budget submission and was consistent with past agency practice as well as appropriations law. The focus on closure activities as described in the FY 2011 submittal is a reasonable approach consistent with the text of the budget submittal and the overall context in which it was submitted. Accordingly, the agency's approach as described in the Executive Director for Operations and Chief Financial Officer's October 4 memorandum did not require further specific approval from the Commission. While I appreciate that a minority of current Commissioners have expressed a different view, the current Commission has formally addressed this question in a number of contexts and a majority has not changed this policy.

Mr. Simpson. Dr. Jaczko, you testified that "there are ongoing discussions" among the commissioners to try to reach an agreement on an final order.

Is that correct?

When was the last time that such "ongoing discussions" have occurred between you and your fellow commissioners?

Isn't true that there have been no such discussions since September 2010. Yes or no?

Mr. Jaczko. Yes, there continue to be ongoing discussions among the Commissioners to try to reach an agreement; with some of these discussions occurring after September, 2010.

Mr. Simpson. To be requested of all Commissioners to respond-- Chairman Jaczko has stated on several occasions that this matter is under active deliberation within the Commission.

Would you please explain that deliberative process and what actions each of you are taking to achieve a timely resolution of this matter?

Mr. Jaczko. This matter remains under deliberation by the Commission.

Mr. Simpson. Dr. Jaczko, you testified that "it was your view" supported by the general counsel that budget document provided the guideline and the direction to move forward on Yucca close out activities.

Please provide the GC's memo and all citations of precedents for this position.

Was your view supported by all the other commissioners at that time?

Mr. Jaczko. The approach to expenditures under the Continuing Resolution is set out in the October 4, 2010, memorandum issued by the NRC's Executive Director for Operations and the Chief Financial Officer. The detailed basis for the General Counsel's conclusion that such an approach was lawful is reflected in a memorandum dated October 15, 2010, from the General Counsel to the Commission. A copy is being provided, but we request that the non-public communication from counsel be respected by the committee.

A majority of Commissioners voted to "not participate" on a proposal to change the direction provided in that memorandum.

Mr. Simpson. Dr. Jaczko, is there a time limit in which the Commission is required to render a final decision to uphold or reverse the ASLB?

Mr. Jaczko. No procedural rule sets a time limit for the Commission to rule on the ASLB's decision. As a practical matter, the time needed for the consideration and resolution of any adjudicatory matter will be informed by a number of factors, including the nature of the legal and/or factual issues that must be decided. These issues may vary widely not only in number, but also in legal and technical complexity, the procedural posture of the case, and the scope of the underlying adjudicatory record to be considered. With this in mind, the Commission's rules of procedure provide broad latitude for the Commission to take action in an individual proceeding to ensure prompt and effective resolution of matters set for adjudication. When prioritizing its adjudicatory workload, the Commission is cognizant of and takes into consideration the potential impact of the timing of its action.

Mr. Simpson. Will you agree not to dissolve the ASLB until you have issued a final order on whether to uphold or reverse their decision that DOE lacks the authority to withdraw the Yucca license?

Mr. Jaczko. As relevant here, our rules provide that the presiding officer's jurisdiction in a proceeding terminates when the Commission renders a final decision. *See* 10 C.F.R. § 2.318(a). The ASLB serves as the presiding officer in this case; its jurisdiction will not terminate until such time as the Commission renders a final decision in the case.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

COMMISSIONER

June 10, 2011

The Honorable Rodney Frelinghuysen, Chairman
Subcommittee on Energy and Water Development
House Committee on Appropriations
Washington, DC 20510

Dear Congressman Frelinghuysen:

On April 6, 2011, the House Committee on Appropriations Subcommittee on Energy and Water Development provided questions for the record to the Nuclear Regulatory Commission (NRC) associated with a March 31, 2011 hearing on the NRC's 2012 budget request. In question 16, Congressman Simpson requested a response from all Commissioners regarding Chairman Jaczko's statements indicating that the High-Level Waste repository adjudicatory matter is "under active deliberation within the Commission." Specifically, Congressman Simpson asked each Commissioner to "explain that deliberative process and what actions each of you are taking to achieve a timely resolution of this matter?"

It is my opinion that, as of the date of the Chairman's statement to the Subcommittee, there was no "active deliberation" occurring between Commissioners on the High-Level Waste adjudicatory matter. By October 29, 2010, all Commissioners had completed voting on the Atomic Safety and Licensing Board's June 29, 2010 Order denying the Department of Energy's Motion to Withdraw their application for construction of a High-Level Waste repository at Yucca Mountain. In accordance with the Commission's internal procedures, the Commission commenced review and comment on a final order that would account for each Commissioner's individual vote, reflect the views of the majority of the Commission, and be publicly issued. However, to date, a majority of the Commission has been unable to agree on the specific language of a final order.

Regarding the actions I have personally taken to achieve timely resolution on this matter, I have offered to my colleagues for consideration a version of a final order that I believed a majority of the Commission could support. I offered these proposals first in early November 2010, again in January 2011, and finally in February 2011. Since these efforts, I have had several discussions over the past month with my colleagues regarding final agency action on this matter. I believe that this matter is a priority and I will continue to engage with my colleagues on the Commission to achieve final Commission resolution.

I am available to respond to any further inquiries you may have on this matter.

Sincerely,

William C. Ostendorff

cc: Congressman Pete Visclosky, Ranking Member

OFFICE OF THE
COMMISSIONER

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 6, 2011

JUN 1 6 2011

The Honorable Rodney Frelinghuysen
Chairman, Subcommittee on Energy
and Water Development
Committee on Appropriations
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

I write in response to Question 16.k. of the follow-up Questions for the Record of the Hearing on the 2012 Budget Request by the Nuclear Regulatory Commission and Department of Energy's Nuclear Energy Programs (March 31, 2011). In question 16k., Representative Simpson of Idaho asked the following question:

> To be requested of all Commissioners to respond – Chairman Jaczko has stated on several occasions that this matter is under active deliberation within the Commission.
>
> - Would you please explain that deliberative process and what actions each of you are taking to achieve a timely resolution of this matter?

I served notice of my recusal from the Yucca Mountain high-level waste repository adjudicatory proceeding on July 15, 2010. Therefore, I have not cast votes or participated in deliberation on votes concerning the appeal of the Board's decision to deny the Department of Energy's motion to withdraw its construction authorization application.

Sincerely,

George Apostolakis

cc: Representative Peter J. Visclosky

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

COMMISSIONER

June 10, 2011

The Honorable Rodney Frelinghuysen
Chairman
Subcommittee on Energy and Water Development
House Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515-3011

Dear Chairman Frelinghuysen:

Enclosed please find my response to the question posed by the Subcommittee after the Hearing on March 31, 2011. Question 16k requested all Commissioners to respond individually.

If you have any questions – please feel free to contact me at (301) 415-8430.

Sincerely,

William D. Magwood, IV

cc: The Honorable Pete Visclosky,
Congressman

Enclosure: As stated.

QUESTION 16k: **To be requested of all Commissioners to respond –**

Chairman Jaczko has stated on several occasions that this matter (the appeal of the Board's decision on the Department of Energy's withdrawal of its license application) is "under active deliberation within the Commission."

- **Would you please explain that deliberative process and what actions each of you are taking to achieve a timely resolution of the matter?**

Response from Commissioner William D. Magwood, IV:

The Atomic Safety and Licensing Board issued its decision, holding that DOE does not have the authority to withdraw its Yucca Mountain construction authorization license application, on June 30, 2010. We requested legal briefs on the question whether the Commission should take review of, and reverse or affirm, the Board's decision. Briefing on this question was complete on July 19, 2010.

The Office of Commission Appellate Adjudication (OCAA), which is responsible for the drafting of the Commission's adjudicatory decisions, submitted its recommendation to the Commission. In the interim, I read the Board's decision and formulated my own views on that decision.

After receiving OCAA's paper, I reviewed OCAA's recommendation and refined my views on the Board's decision and on the legal reasoning I believed should be incorporated into the Commission's ruling on the appeal. I prepared a lengthy and comprehensive vote on the appeal of the Board's decision, and issued this vote on September 15, 2010. I consider this vote to be my final decision on the appeal. All votes were filed by October 29, 2010.

After voting on an adjudicatory paper is complete, the next step in the Commission's process is the preparation, by OCAA, of a Commission order that reflects the Commissioners' votes. We vote on the language of this order. Once the language of the order receives majority approval, an affirmation is scheduled, at which we publicly affirm our votes. All participating Commissioners voted on a proposed order that was drafted by OCAA but we did not achieve a majority on the language of the order. As a result the order has not yet proceeded to affirmation.

Since that time, our offices have had numerous conversations in an effort to arrive at language that could be affirmed in a public meeting. I have proposed alternate language, have reviewed language proposed by my colleagues, have directed my staff in staff-level negotiations, and have negotiated directly with my colleagues on proposed language for an affirmable order. Discussions have varied in intensity over time but have never ceased. We continue to work toward an affirmable order.

COMMISSIONER

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

June 10, 2011

The Honorable Rodney P. Frelinghuysen
Chairman, Subcommittee on Energy and
  Water Development
Committee on Appropriations
U.S. House of Representatives
Washington, D.C. 20515

Dear Chairman Frelinghuysen:

I write to address the question for the record directed to each NRC Commissioner resulting from the Subcommittee's March 31, 2011 hearing on the NRC's 2012 budget request. Each Commissioner was asked to explain the Commission's deliberative process used to review the June 2010 Construction Authorization Board decision to deny the Department of Energy's Motion to Withdraw the Yucca Mountain application (LBP-10-11), and to explain the actions that each Commissioner is taking to achieve timely resolution of this adjudicatory matter. Thank you for the opportunity to express my individual views on this subject. My response is attached. Please feel free to contact me should you have further questions.

Sincerely,

Kristine L. Svinicki

Enclosure: As stated

cc: The Honorable Pete Visclosky, Ranking Member

ENCLOSURE

Subcommittee on Energy and Water Development
Committee on Appropriations
United States House of Representatives
March 31, 2011 Hearing
Questions for the Record

Additional Questions from Congressman Simpson

QUESTION:

To be requested of all Commissioners to respond – Chairman Jaczko has stated on several occasions that this matter is under active deliberation within the Commission.

- Would you please explain that deliberative process and what actions each of you are taking to achieve a timely resolution of this matter?

RESPONSE OF COMMISSIONER SVINICKI:

The Commission usually responds to and resolves adjudicatory issues through the issuance of Commission orders. Typically, the Commission votes on draft orders proposed by the Office of Commission Appellate Adjudication (OCAA). Once all participating Commissioners have cast their votes, OCAA circulates a draft final order incorporating majority-supported edits and noting individual Commissioner's views. Prior to issuance of the final order, a majority of Commissioners participating in the action must agree on the exact text of the draft final order and that it accurately represents the outcome of the voting process. Once a majority of the Commission has approved a draft final order, the Commissioners affirm their votes in a public affirmation session and the order is issued by the Secretary of the Commission.

On August 25, 2010, I voted on the matter of whether to take review of the Construction Authorization Board's (CAB) decision to deny the Department of Energy's (DOE) Motion to Withdraw (LBP-10-11). Shortly after all votes were cast on the matter, a draft final order reflecting the final votes was circulated to the Commission for its approval. Upon receiving the draft final order, I considered various options for language that could garner majority support for inclusion in the final order. Commissioner Ostendorff and I discussed possible alternative language for the draft final order and these proposals were shared with Commissioner Magwood and Chairman Jaczko. I registered my position on the draft final order nine days after it was submitted to the Commission.

In the intervening months since taking a position on the draft final order, Commissioner Ostendorff and I have discussed possible options for resolving the matter and bringing it to closure. On at least three occasions that I am aware of, Commissioner Ostendorff presented his colleagues with alternative language for the draft final order. Although I indicated to Commissioner Ostendorff that I supported these proposals, a majority of the Commission did not register support for any variation of the draft final order language. I continue to work on developing order language that may garner majority support. However, to date, the Commission continues to be unable to issue a final order reflecting the outcome of the votes on the Motion to Withdraw.

In summary, I cast a timely vote on the question of whether to take review of LBP-10-11 regarding the CAB's denial of DOE's Motion to Withdraw, and promptly registered my position on the draft final Commission order in that matter. Although I have engaged in deliberations and discussions with my Commission colleagues on DOE's Motion to Withdraw, I cannot characterize these deliberations as continually "active" during the entire period since I cast my vote.

ADDITIONAL QUESTIONS FROM RANKING MEMBER VISCLOSKY OF INDIANA

Ranking Member Visclosky. Dr. Lyons, you and Secretary Chu have both spoken with great enthusiasm for fast spectrum reactors. For example, you held a press conference at DOE where you repeated your interest in fast spectrum reactors:

"We have a long term research program that wants to see if we can take... used fuel ...and extract more of the energy content out of it in an economical way that's proliferation resistant... and if we do that,... that means you can greatly reduce the amount of end product waste . I don't mean by a factor of 2 or so in today's technology, I mean a factor of 10, or 20 or 50. All very important stuff."

How is DOE's interest in fast spectrum reactors reflected in your FY12 Budget Request? If these technologies are so important for extracting energy from nuclear materials, and for minimizing wastes, what is the Department specifically doing to advance fast spectrum reactors?

Dr. Lyons. A variety of fast reactor and fuel cycle strategies are being considered under the Fuel Cycle Research and Development (FCR&D) program. These include the traditional role of fast reactors in a fully closed fuel cycle which could lead to uranium utilization > 90% or "modified open cycle" breed-and-burn concepts that could achieve ~10%-50% utilization with no or limited recycle.

The FCR&D program is conducting R&D in many technical areas that, if successful, would eventually support the development of fuel cycle options which would utilize fast spectrum reactors. We are developing advanced separations and waste management technologies that could be used to recycle used nuclear fuel as well as advanced fuel forms that could be used in fast spectrum reactors.

The refinement of fast reactor concepts and technology development is covered in the Advanced Reactor Concepts (ARC) portion of the FY 2012 budget. Given that demonstration fast reactors have successfully been built and operated in many international fast reactor programs (e.g., Experimental Breeder Reactor II and Fast Flux Test Reactor in the United States), the base technology for sodium-cooled fast reactors (SFR) is established, and the majority of R&D needs are related to performance, not viability.

Ranking Member Visclosky. Is it the Department's intent to develop and help deploy fast spectrum reactors_that also will be safe, proliferation resistant, and have the prospect of being economically competitive?

Dr. Lyons. Priority fast reactor R&D being conducted in the Advanced Reactor Concepts budget focuses on key innovations to improve cost and performance. This scope includes technology innovations and concept refinements, including advanced structural materials that could significantly reduce the plant commodities, and advanced energy conversion technology that could improve thermal efficiency. Also a priority is the development of advanced modeling and simulation techniques to optimize reactor design and assure safety performance. In the international fast reactor community, U.S. experts are championing the use of inherent safety behavior to prevent severe accidents; this approach was demonstrated in the landmark passive safety tests at the Experimental Breeder Reactor II and Fast Flux Test Reactor.

With regard to proliferation resistance, the fast reactor concept development efforts reflect the importance of material security and physical protection. Only fuel cycle options without pure plutonium separation are being considered and integral siting of the reactor and fuel cycle facilities can reduce transport and diversion concerns. Advanced monitoring and safeguard technologies are also being developed.

Ranking Member Visclosky. Beyond the incidental problems of inadequate emergency resources and procedures, it is becoming evident that the nuclear fuel has been the common and fundamental weak link in the multiple chains of events at the reactors: with rapidly progressing sequences of clad failure, hydrogen production, radioactive release and at least partial meltdowns. As you know, the fuel at the Japanese reactors is similar to fuel used today in all US nuclear reactors. This Subcommittee has been supportive of DOE's efforts to research new fuel options, in particular your recent work on fully ceramic-coated fuel that could provide a meltdown-proof fuel for the Light Water Reactors.

Could you please tell us if there are plans underway to facilitate the near-term commercialization of this and other types of nuclear fuels that could address the multiple failures of the Japanese reactors in a fundamental way and in a time scale relevant to the current nuclear debate?

Dr. Lyons. The Light Water Reactor Sustainability (LWRS) Program is working collaboratively with industry to develop safer and more economical nuclear fuel systems that could be deployed in the existing fleet of nuclear power plants. The primary objective is to develop a fuel with significantly larger safety margins for normal operation and severe accident conditions. To meet this objective, we are developing a ceramic cladding for the fuel that, at the very high temperatures occurring during severe accidents, would retain fuel fission products minimize hydrogen generation.

Silicon carbide (SiC) is a ceramic material that has high strength and very low chemical reactivity at high temperatures when compared to the zirconium alloys used in current nuclear fuel designs. The SiC-based cladding being developed is a complex system, utilizing different materials intended to maximize its performance characteristics under normal and accident conditions. The research being undertaken provides information on the stability and properties of SiC when exposed to very high radiation fields. We are using this knowledge to establish the technical viability of SiC fuel cladding.

Developing an advanced SiC nuclear fuel cladding that is reliable and licensable by the U.S. Nuclear Regulatory Commission (NRC) will require a detailed understanding of the basic material science as well as understanding of SiC-water chemistry in a nuclear reactor environment. As this research matures, we will increasingly depend on nuclear fuel vendors to test, design, and develop the specific commercial reactor fuel designs; however, nuclear fuel vendors typically anticipate 10-years or more to design, test, and license for even the smallest changes in nuclear fuel systems. The SiC cladding activity is a significant and complex project with significant time and expense required for confirmatory testing using test reactors. We plan to start the irradiation of advanced nuclear fuel designs – designs that are representative of commercial nuclear fuel – in 2015. Commercial implementation could occur in the following five-year period as test rods, fuel bundles, and core reload designs are developed.

At the same time the Office of Nuclear Energy Fuel Cycle Research and Development program is working on development of advanced ceramic-matrix fuel embodying fully ceramic-coated fuel particles that can significantly contribute to progress toward the development of "meltdown-proof fuel for the Light Water Reactors."

ADDITIONAL QUESTIONS FROM CHAIRMAN ROGERS OF KENTUCKY

DEPLETED URANIUM "TAILS"

Chairman Rogers. The Department of Energy has over 60,000 cylinders of depleted uranium hexafluoride "tails" stored at two gaseous diffusion enrichment plants, including a subset of high assay tails which are ripe for re-enrichment.

Is it correct that DOE's current plan is to convert these tails into uranium oxide for disposal?

If these tails can instead be re-enriched and sold, would this generate revenue for the Department?

Does the Department have authority to enrich these tails and sell or barter some of the uranium resulting from the tails processing to pay for the enrichment process?

Assuming it is determined such a sale would not have a significant adverse impact on the domestic uranium market, would you support a program to re-enrich these tails to reap this fiscal dividend while the remaining gaseous diffusion plant is still in operation?

When will the Department of Energy commence a tails re-enrichment program?

Dr. Lyons. DOE is evaluating its options for potential future use of the highest-assay depleted uranium hexafluoride in its inventory; these options may include alternatives to de-conversion to uranium oxide. In making decisions on the proper path forward, the Department will consider the potential economic benefit to the taxpayer and the potential market impacts of processing and selling the higher-assay tails consistent with the policies and principles set forth in the Department's Excess Uranium Inventory Management Plan. We also are aware of stakeholder interest in tails re-enrichment, and intend to give due consideration to any formal proposals submitted to the Department.

If the tails were re-enriched and sold, the revenue would accrue to the general Treasury, not to the Department. The Department has the authority to barter uranium to fund potential re-enrichment, but any such transfer in exchange for services would have to comply with applicable portions of the USEC Privatization Act. As previously stated, the Department is evaluating its options for potential future use of the highest-assay depleted uranium hexafluoride and cannot state at this time whether it would support or commence a tails re-enrichment program.

AMERICAN CENTRIFUGE

Chairman Rogers. For nuclear power, there is only one American company that enriches uranium fuel. They compete against French, European, and Russian companies and are poised to deploy the next generation of enrichment technology through their American Centrifuge project. This "all American" technology will allow them to remain competitive with these foreign companies and provide a domestic source of nuclear fuel for decades to come, while creating 8000 high quality jobs. However, American Centrifuge depends on a DOE loan guarantee for funding, which has been pending before your Department since 2008.

I believe the American Centrifuge project is good for our nation. Do you agree that a domestic supplier of enriched uranium, using American technology, is important for our energy and national security?

What can you do to speed up the loan guarantee process?

When will we see approval of this loan guarantee application?

Dr. Lyons. I agree that a domestic supplier of enriched uranium, using American technology, serves our nation's energy and national security objectives. The Department's Loan Guarantee Office is currently reviewing USEC's loan guarantee application and is the sole programmatic office within the Department responsible for that review. I am not able to affect the speed of the Loan Guarantee's independent review, and cannot speculate on when the Loan Guarantee Office will complete its review. Questions about the USEC loan guarantee should be directed to DOE's Loan Guarantee Program.

BLUE RIBBON COMMISSION NUCLEAR FUEL REVIEW

Chairman Rogers. Please report on the status of the Blue Ribbon Commission's review of nuclear fuel issues. Is the Commission making site visits? If so, to which locations? Understanding that a draft report has been submitted to the Secretary, when will the Commission's final report be available?

Dr. Lyons. At the time of this hearing, the Blue Ribbon Commission on America's Nuclear Future (the Commission) has completed a series of public meetings, site visits, and international visits in support of their effort to conduct thorough review of policies for managing the backend of the nuclear fuel cycle. In 2010, with the Department's approval, the Commission established three subcommittees to review specific portions of the nuclear fuel cycle. These subcommittees are: Reactor and Fuel Cycle Technology, Transportation and Storage, and Disposal. The subcommittees have met publicly several times over the last year and are now preparing their separate subcommittee reports. The subcommittee reports will form a basis for the Commission's draft report.

The Commission has made site visits. To date, the Commission has visited in the U.S.: the Idaho National Laboratory in Idaho Falls, Idaho; the Hanford Site in Richland, Washington; the Maine Yankee Independent Spent Fuel Storage Installation (ISFSI) in Wiscasset, Maine; the Savannah River Site in Aiken, South Carolina; and the Waste Isolation Pilot Plant in Carlsbad, New Mexico.

The Commission draft report has not yet been submitted to the Secretary. It is due by July 29, 2011. The Commission's final report is due no later than January 29, 2012.

WITNESSES

	Page
Chu, Hon. Dr. Steven	1
Jaczko, Gregory	187
Lyons, Dr. Peter	187

○